

L Number	Hits	Search Text	DB	Time stamp
1	50	("6202073" "5212770" "5579471" "5692142" "5751286" "5838315" "5917488" "5001469" "5274363" "5499327" "5542003" "5682326" "5694150" "5726669" "5781245" "5999173" "4438495" "4528585" "4868766" "5020115" "5384907" "5404441" "5447153" "5510808" "5581243" "5619639" "5623283" "5634102" "5642124" "5793367" "5856830" "5870093" "5973691" "6023274" "6069606" "6091422" "6147769" "6198462" "4631599" "4847605" "4852002" "5027291" "5185597" "5193148" "5249296" "5297251" "5315697" "5351129" "5353393" "5379374") .pn.	USPAT	2003/01/21 13:52
2	1608	345/810 or 345/781 or 345/833 or 345/630 or 345/634 or 345/637 or 345/799 or 345/815 or 345/819 or 345/820 or 345/843 or 345/730 or 345/732 or 345/776 or 345/777	USPAT	2003/01/21 13:54
3	82	window ADJ appearance	USPAT	2003/01/21 13:54
4	0	slide ADJ into	USPAT	2003/01/21 13:55
5	2132	sliding ADJ window	USPAT	2003/01/21 13:55
6	82	(window ADJ appearance) and (window ADJ appearance)	USPAT	2003/01/21 13:56

7	2	( ("6202073" "5212770" "5579471" "5692142" "5751286" "5838315" "5917488" "5001469" "5274363" "5499327" "5542003" "5682326" "5694150" "5726669" "5781245" "5999173" "4438495" "4528585" "4868766" "5020115" "5384907" "5404441" "5447153" "5510808" "5581243" "5619639" "5623283" "5634102" "5642124" "5793367" "5856830" "5870093" "5973691" "6023274" "6069606" "6091422" "6147769" "6198462" "4631599" "4847605" "4852002" "5027291" "5185597" "5193148" "5249296" "5297251" "5315697" "5351129" "5353393" "5379374") .pn. ) and ((window ADJ appearance) and (window ADJ appearance)) (345/810 or 345/781 or 345/833 or 345/630 or 345/634 or 345/637 or 345/799 or 345/815 or 345/819 or 345/820 or 345/843 or 345/730 or 345/732 or 345/776 or 345/777 ) and ((window ADJ appearance) and (window ADJ appearance)) slide ADJ in	USPAT	2003/01/21 13:56
8	5	(345/810 or 345/781 or 345/833 or 345/630 or 345/634 or 345/637 or 345/799 or 345/815 or 345/819 or 345/820 or 345/843 or 345/730 or 345/732 or 345/776 or 345/777 ) and ((window ADJ appearance) and (window ADJ appearance)) slide ADJ in	USPAT	2003/01/21 14:18
9	25	slide ADJ in	USPAT	2003/01/21 14:18
10	7512	slide ADJ out	USPAT	2003/01/21 14:18
11	5	(345/810 or 345/781 or 345/833 or 345/630 or 345/634 or 345/637 or 345/799 or 345/815 or 345/819 or 345/820 or 345/843 or 345/730 or 345/732 or 345/776 or 345/777 ) and (window ADJ appearance)	USPAT	2003/01/21 14:19

12	0	(345/810 or 345/781 or 345/833 or 345/630 or 345/634 or 345/637 or 345/799 or 345/815 or 345/819 or 345/820 or 345/843 or 345/730 or 345/732 or 345/776 or 345/777 ) and (slide ADJ in)	USPAT	2003/01/21 14:19
13	5	(345/810 or 345/781 or 345/833 or 345/630 or 345/634 or 345/637 or 345/799 or 345/815 or 345/819 or 345/820 or 345/843 or 345/730 or 345/732 or 345/776 or 345/777 ) and (slide ADJ out)	USPAT	2003/01/21 14:19
14	0	(window ADJ appearance) and (slide ADJ in)	USPAT	2003/01/21 14:19
15	1	(window ADJ appearance) and (slide ADJ out)	USPAT	2003/01/21 14:21
16	0	(("6202073" "5212770" "5579471" "5692142" "5751286" "5838315" "5917488" "5001469" "5274363" "5499327" "5542003" "5682326" "5694150" "5726669" "5781245" "5999173" "4438495" "4528585" "4868766" "5020115" "5384907" "5404441" "5447153" "5510808" "5581243" "5619639" "5623283" "5634102" "5642124" "5793367" "5856830" "5870093" "5973691" "6023274" "6069606" "6091422" "6147769" "6198462" "4631599" "4847605" "4852002" "5027291" "5185597" "5193148" "5249296" "5297251" "5315697" "5351129" "5353393" "5379374").pn. ) and (slide ADJ in)	USPAT	2003/01/21 14:21

17	0	( ("6202073" "5212770" "5579471" "5692142" "5751286" "5838315" "5917488" "5001469" "5274363" "5499327" "5542003" "5682326" "5694150" "5726669" "5781245" "5999173" "4438495" "4528585" "4868766" "5020115" "5384907" "5404441" "5447153" "5510808" "5581243" "5619639" "5623283" "5634102" "5642124" "5793367" "5856830" "5870093" "5973691" "6023274" "6069606" "6091422" "6147769" "6198462" "4631599" "4847605" "4852002" "5027291" "5185597" "5193148" "5249296" "5297251" "5315697" "5351129" "5353393" "5379374") .pn. ) and (slide ADJ out) sliding ADJ into	USPAT	2003/01/21 14:22
18	0		USPAT	2003/01/21 14:23
19	10	(window ADJ appearance) and sliding	USPAT	2003/01/21 14:23

L Number	Hits	Search Text	DB	Time stamp
2	1608	345/810 or 345/781 or 345/833 or 345/630 or 345/634 or 345/637 or 345/799 or 345/815 or 345/819 or 345/820 or 345/843 or 345/730 or 345/732 or 345/776 or 345/777	USPAT	2003/01/21 13:54
3	82	window ADJ appearance	USPAT	2003/01/21 13:54
4	0	slide ADJ into	USPAT	2003/01/21 13:55
5	2132	sliding ADJ window	USPAT	2003/01/21 13:55
6	82	(window ADJ appearance) and (window ADJ appearance)	USPAT	2003/01/21 13:56
7	2	((("6202073" "5212770" "5579471" "5692142" "5751286" "5838315" "5917488" "5001469" "5274363" "5499327" "5542003" "5682326" "5694150" "5726669" "5781245" "5999173" "4438495" "4528585" "4868766" "5020115" "5384907" "5404441" "5447153" "5510808" "5581243" "5619639" "5623283" "5634102" "5642124" "5793367" "5856830" "5870093" "5973691" "6023274" "6069606" "6091422" "6147769" "6198462" "4631599" "4847605" "4852002" "5027291" "5185597" "5193148" "5249296" "5297251" "5315697" "5351129" "5353393" "5379374") .pn. ) and ((window ADJ appearance) and (window ADJ appearance))	USPAT	2003/01/21 13:56

8	5	(345/810 or 345/781 or 345/833 or 345/630 or 345/634 or 345/637 or 345/799 or 345/815 or 345/819 or 345/820 or 345/843 or 345/730 or 345/732 or 345/776 or 345/777 ) and ((window ADJ appearance) and (window ADJ appearance))	USPAT	2003/01/21 14:18
9	25	slide ADJ in	USPAT	2003/01/21 14:18
10	7512	slide ADJ out	USPAT	2003/01/21 14:18
11	5	(345/810 or 345/781 or 345/833 or 345/630 or 345/634 or 345/637 or 345/799 or 345/815 or 345/819 or 345/820 or 345/843 or 345/730 or 345/732 or 345/776 or 345/777 ) and (window ADJ appearance)	USPAT	2003/01/21 14:19
12	0	(345/810 or 345/781 or 345/833 or 345/630 or 345/634 or 345/637 or 345/799 or 345/815 or 345/819 or 345/820 or 345/843 or 345/730 or 345/732 or 345/776 or 345/777 ) and (slide ADJ in)	USPAT	2003/01/21 14:19
13	5	(345/810 or 345/781 or 345/833 or 345/630 or 345/634 or 345/637 or 345/799 or 345/815 or 345/819 or 345/820 or 345/843 or 345/730 or 345/732 or 345/776 or 345/777 ) and (slide ADJ out)	USPAT	2003/01/21 14:19
14	0	(window ADJ appearance) and (slide ADJ in)	USPAT	2003/01/21 14:19
15	1	(window ADJ appearance) and (slide ADJ out)	USPAT	2003/01/21 14:21

16	0	( ("6202073" "5212770" "5579471" "5692142" "5751286" "5838315" "5917488" "5001469" "5274363" "5499327" "5542003" "5682326" "5694150" "5726669" "5781245" "5999173" "4438495" "4528585" "4868766" "5020115" "5384907" "5404441" "5447153" "5510808" "5581243" "5619639" "5623283" "5634102" "5642124" "5793367" "5856830" "5870093" "5973691" "6023274" "6069606" "6091422" "6147769" "6198462" "4631599" "4847605" "4852002" "5027291" "5185597" "5193148" "5249296" "5297251" "5315697" "5351129" "5353393" "5379374") .pn. ) and (slide ADJ in)	USPAT	2003/01/21 14:21
----	---	---	-------	---------------------

17	0	( ("6202073" "5212770" "5579471" "5692142" "5751286" "5838315" "5917488" "5001469" "5274363" "5499327" "5542003" "5682326" "5694150" "5726669" "5781245" "5999173" "4438495" "4528585" "4868766" "5020115" "5384907" "5404441" "5447153" "5510808" "5581243" "5619639" "5623283" "5634102" "5642124" "5793367" "5856830" "5870093" "5973691" "6023274" "6069606" "6091422" "6147769" "6198462" "4631599" "4847605" "4852002" "5027291" "5185597" "5193148" "5249296" "5297251" "5315697" "5351129" "5353393" "5379374").pn. ) and (slide ADJ out) sliding ADJ into	USPAT	2003/01/21 14:22
18	0		USPAT	2003/01/21 14:23
19	10	(window ADJ appearance) and sliding	USPAT	2003/01/21 14:24
20	0	((345/810 or 345/781 or 345/833 or 345/630 or 345/634 or 345/637 or 345/799 or 345/815 or 345/819 or 345/820 or 345/843 or 345/730 or 345/732 or 345/776 or 345/777 ) and (window ADJ appearance)) and sliding	USPAT	2003/01/21 14:25

21	0	<pre>( ("6202073"   "5212770"   "5579471"   "5692142"   "5751286"   "5838315"   "5917488"   "5001469"   "5274363"   "5499327"   "5542003"   "5682326"   "5694150"   "5726669"   "5781245"   "5999173"   "4438495"   "4528585"   "4868766"   "5020115"   "5384907"   "5404441"   "5447153"   "5510808"   "5581243"   "5619639"   "5623283"   "5634102"   "5642124"   "5793367"   "5856830"   "5870093"   "5973691"   "6023274"   "6069606"   "6091422"   "6147769"   "6198462"   "4631599"   "4847605"   "4852002"   "5027291"   "5185597"   "5193148"   "5249296"   "5297251"   "5315697"   "5351129"   "5353393"   "5379374") .pn. ) and ((window ADJ appearance) and (window ADJ appearance))) and (slide ADJ in)</pre>	USPAT	2003/01/21 14:26
----	---	---	-------	---------------------

22	0	<pre>((("6202073" "5212770" "5579471" "5692142" "5751286" "5838315" "5917488" "5001469" "5274363" "5499327" "5542003" "5682326" "5694150" "5726669" "5781245" "5999173" "4438495" "4528585" "4868766" "5020115" "5384907" "5404441" "5447153" "5510808" "5581243" "5619639" "5623283" "5634102" "5642124" "5793367" "5856830" "5870093" "5973691" "6023274" "6069606" "6091422" "6147769" "6198462" "4631599" "4847605" "4852002" "5027291" "5185597" "5193148" "5249296" "5297251" "5315697" "5351129" "5353393" "5379374").pn. ) and ((window ADJ appearance) and (window ADJ appearance))) and (slide ADJ out)</pre>	USPAT	2003/01/21 14:26
23	0	<pre>((345/810 or 345/781 or 345/833 or 345/630 or 345/634 or 345/637 or 345/799 or 345/815 or 345/819 or 345/820 or 345/843 or 345/730 or 345/732 or 345/776 or 345/777 ) and ((window ADJ appearance) and (window ADJ appearance))) and (slide ADJ in)</pre>	USPAT	2003/01/21 14:26
24	0	<pre>((345/810 or 345/781 or 345/833 or 345/630 or 345/634 or 345/637 or 345/799 or 345/815 or 345/819 or 345/820 or 345/843 or 345/730 or 345/732 or 345/776 or 345/777 ) and ((window ADJ appearance) and (window ADJ appearance))) and (slide ADJ out)</pre>	USPAT	2003/01/21 14:26

1	50	("6202073" "5212770" "5579471" "5692142" "5751286" "5838315" "5917488" "5001469" "5274363" "5499327" "5542003" "5682326" "5694150" "5726669" "5781245" "5999173" "4438495" "4528585" "4868766" "5020115" "5384907" "5404441" "5447153" "5510808" "5581243" "5619639" "5623283" "5634102" "5642124" "5793367" "5856830" "5870093" "5973691" "6023274" "6069606" "6091422" "6147769" "6198462" "4631599" "4847605" "4852002" "5027291" "5185597" "5193148" "5249296" "5297251" "5315697" "5351129" "5353393" "5379374") .pn.	USPAT	2003/01/21 14:47
25	339	slide ADJ show	USPAT	2003/01/21 14:48
27	0	(slide ADJ in) and ((window ADJ appearance) and (slide ADJ show))	USPAT	2003/01/21 14:48
26	1	(window ADJ appearance) and (slide ADJ show)	USPAT	2003/01/21 14:49
28	0	(slide ADJ out) and ((window ADJ appearance) and (slide ADJ show))	USPAT	2003/01/21 14:49

L Number	Hits	Search Text	DB	Time stamp
1	82	window ADJ appearance	USPAT	2003/01/22 12:06
2	13	(window ADJ appearance) and slide	USPAT	2003/01/22 12:06
3	1	((window ADJ appearance) and slide) and rate	USPAT	2003/01/22 12:07
4	17	(window ADJ appearance) and rate	USPAT	2003/01/22 12:15
5	15	(window ADJ appearance) and speed	USPAT	2003/01/22 12:15
6	9516	user ADJ defined	USPAT	2003/01/22 12:16
7	8	((window ADJ appearance) and speed) and (user ADJ defined)	USPAT	2003/01/22 12:16

*Ex-1 Search proposed*



US006181342B1

(12) **United States Patent**  
Niblack

(10) Patent No.: US 6,181,342 B1  
(45) Date of Patent: Jan. 30, 2001

(54) **COMPUTER FILE DIRECTORY SYSTEM DISPLAYING VISUAL SUMMARIES OF VISUAL DATA IN DESKTOP COMPUTER DOCUMENTS FOR QUICKLY IDENTIFYING DOCUMENT CONTENT**

5,715,416 2/1998 Baker .  
5,731,813 3/1998 O'Rourke et al. .  
5,752,244 \* 5/1998 Rose et al. .... 707/5  
5,765,176 \* 6/1998 Blomberg ..... 707/514

\* cited by examiner

(75) Inventor: Carlton Wayne Niblack, San Jose, CA (US)

Primary Examiner—Raymond J. Bayerl

Assistant Examiner—Cao H. Nguyen

(74) Attorney, Agent, or Firm—John L. Rogitz

(73) Assignee: International Business Machines Corp., Armonk, NY (US)

(57) **ABSTRACT**

(\*) Notice: Under 35 U.S.C. 154(b), the term of this patent shall be extended for 0 days.

A graphical user interface to desktop documents presents a visual display of visual summaries extracted from still image files, video image files, presentation slide documents, and word processing documents that include figures therein, in a computer file system, in response to a computer user requesting a directory listing. The user can select a visual summaries to cause the computer to search for files/documents containing similar images. The visual summaries can be presented in a hierarchy, with the top level of the hierarchy containing one visual summary per file/document, the next level containing visual summaries of all images in each file/document, and the lowest level containing visual summaries of each individual component, if any, in each image in a document. Further, for an alpha-numeric document having no images, the corresponding visual summary can be a visual representation of the appearance of a portion of the document, such as a portion of the first page of the document.

(21) Appl. No.: 09/110,529

(22) Filed: Jul. 6, 1998

(51) Int. Cl.<sup>7</sup> ..... G06F 7/00

(52) U.S. Cl. ..... 345/356; 345/334; 345/349

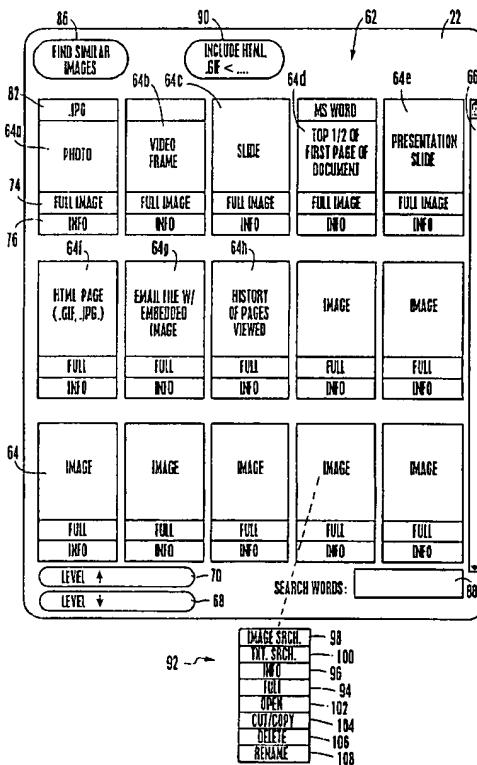
(58) Field of Search ..... 345/345, 346,  
345/334, 349, 356, 968, 348, 335; 707/3,  
4, 104

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,060,135 10/1991 Levine et al. .  
5,479,602 12/1995 Baecker et al. .  
5,579,471 \* 11/1996 Barber et al. ..... 345/326  
5,623,681 4/1997 Rivette et al. .

4 Claims, 5 Drawing Sheets



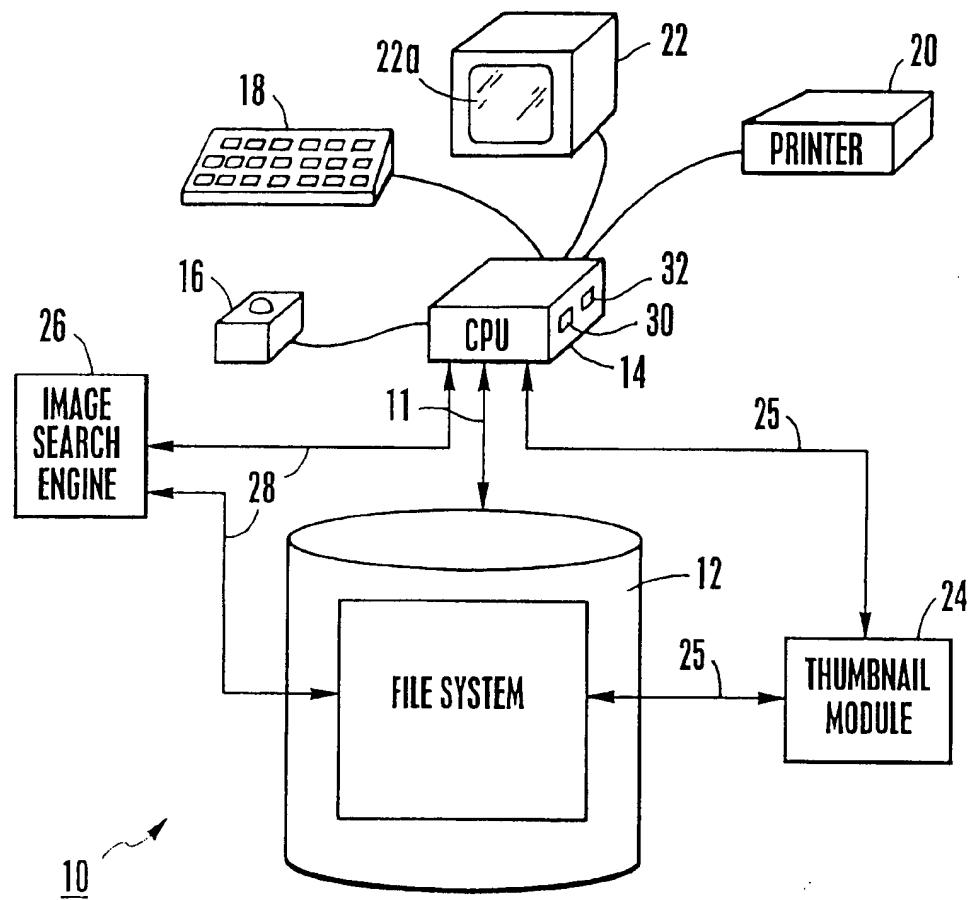


Fig. 1

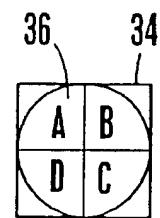


Fig. 2

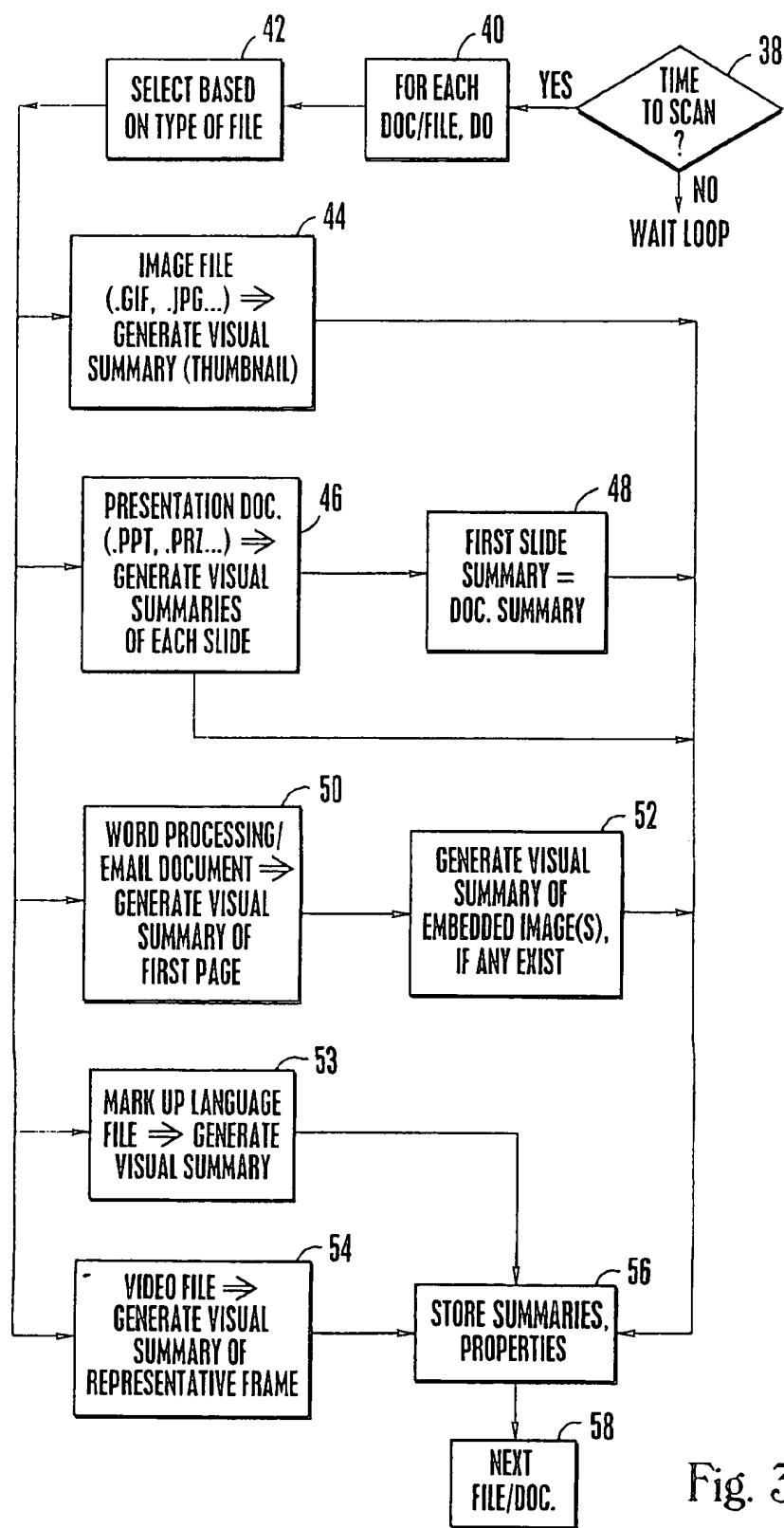


Fig. 3

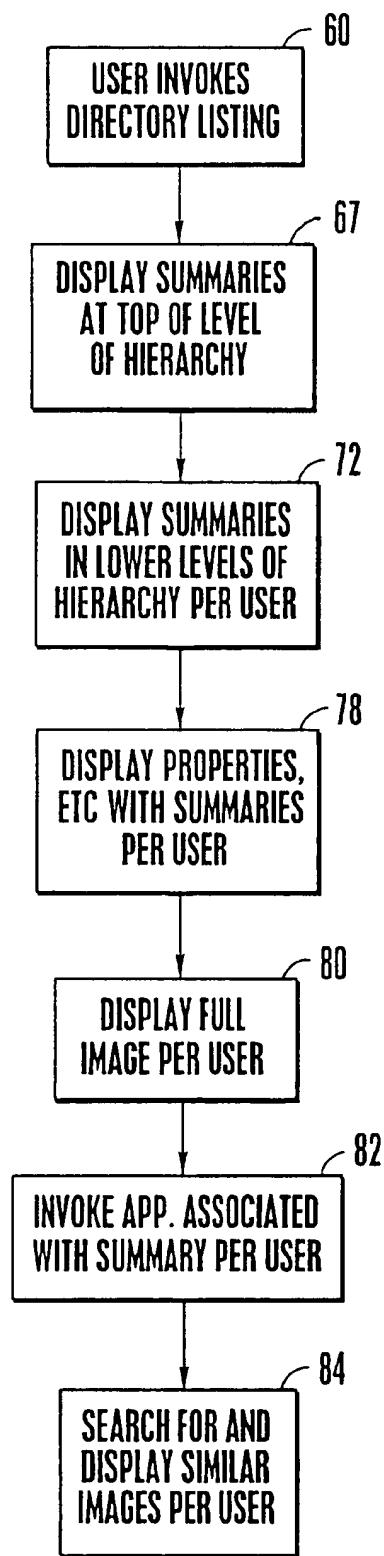


Fig. 4

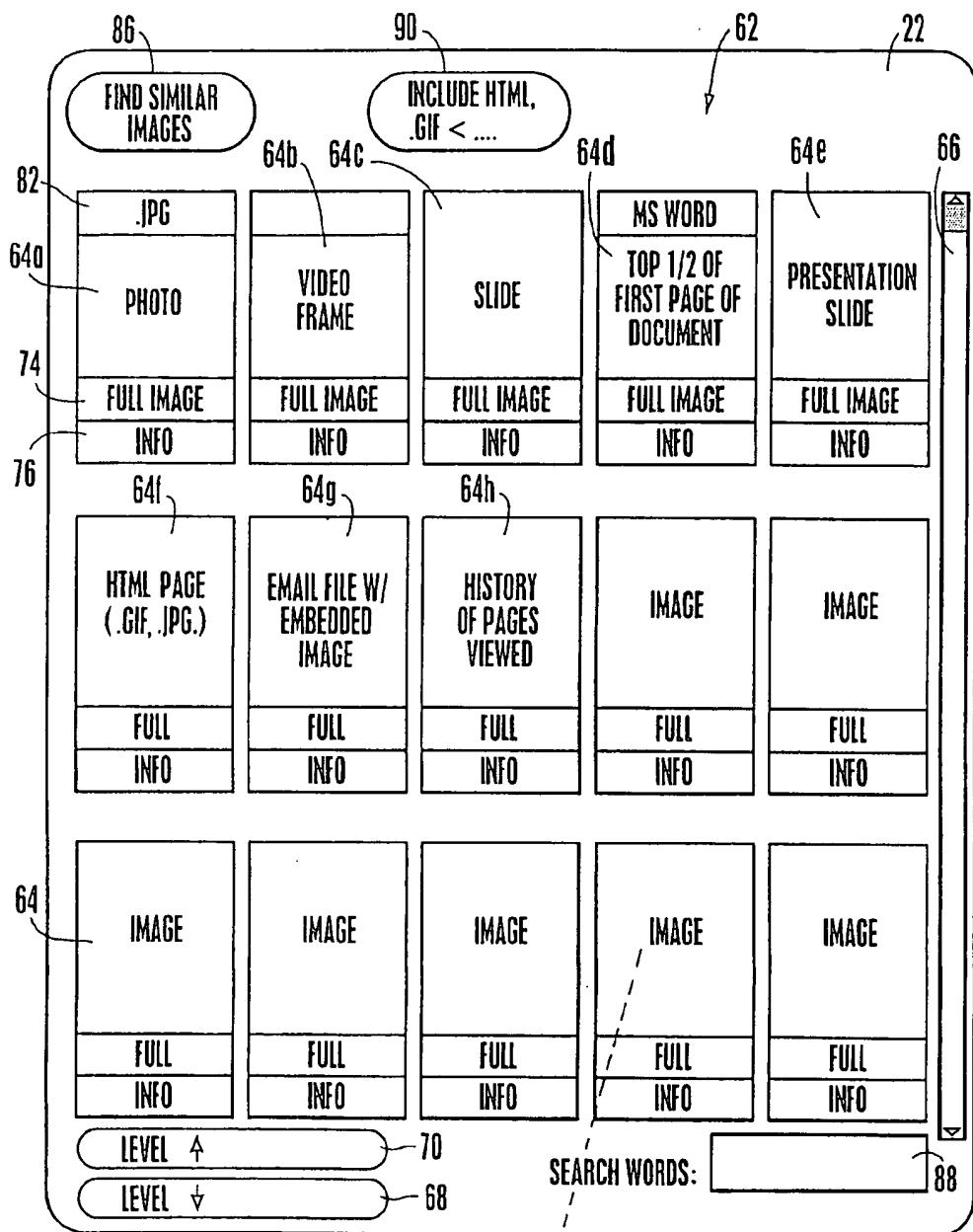


IMAGE SRCH.	98
TXT. SRCH.	100
INFO	96
FULL	94
OPEN	102
CUT/COPY	104
DELETE	106
RENAME	108

Fig. 5

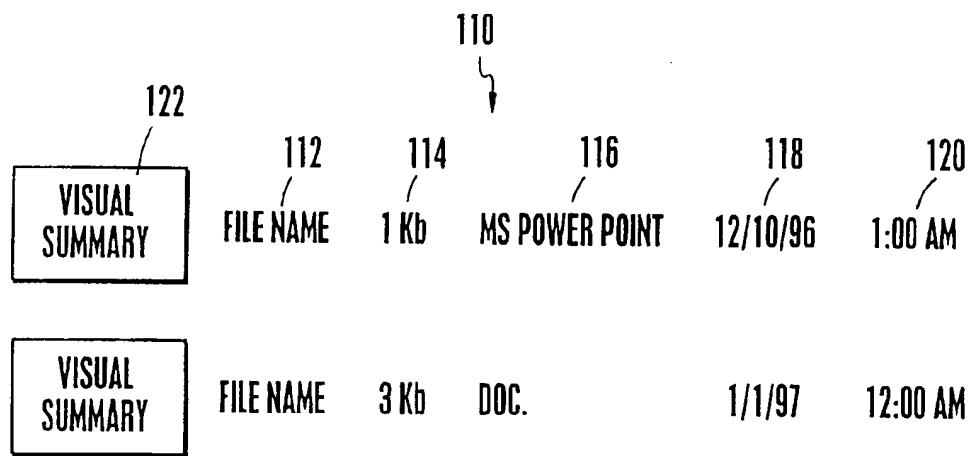


Fig. 6

**COMPUTER FILE DIRECTORY SYSTEM  
DISPLAYING VISUAL SUMMARIES OF  
VISUAL DATA IN DESKTOP COMPUTER  
DOCUMENTS FOR QUICKLY IDENTIFYING  
DOCUMENT CONTENT**

**BACKGROUND OF THE INVENTION**

**1. Field of the Invention**

The present invention relates generally to desktop computer file systems, and more particularly to systems and methods for presenting effective lists of files in a file system of a desktop, laptop, or hand-held computer.

**2. Description of the Related Art**

Increasingly, desktop and laptop computers contain not only alpha-numeric documents, e.g., text-only documents made using a word processing application program such as WordPerfect® or Microsoft Word®, but documents and files that include visual data as well. By "visual data" is meant data that is not exclusively alpha-numeric. Accordingly, "visual data" includes scanned photographic images, computer- or human-generated art images, clip art, video frames, logos, banners, screen shots, Web pages, computer-generated presentation slides and other business graphics that are generated by applications such as Freelance®, Excel®, 1-2-3®, or PowerPoint®, and other genre of images. Such visual data can be contained in documents, by which is meant a data group that can include alpha numeric data that is intended to be edited using an associated application. Examples of such documents are slides made using the Power Point® graphics application marketed by Microsoft Corp., as well as word processing documents and email documents, which, despite being generally considered to contain only alpha-numeric text data, might nonetheless include embedded images that are stored as image data bits within the documents. Also, visual data can be contained in non-document image files that simply hold, e.g., photographic images. An example of a non-document image file is a gif-formatted file or jpg-formatted file.

To access desktop files and documents, users of desktop and laptop computers invoke the files/documents by name. Often, a user cannot remember the exact name of a file or document, so the user requests a directory listing, which is a list of file directories in a file system or, on a lower hierarchical level, a list of files/documents in a particular directory. In response to the user's request, a directory list or file list is presented on the user's monitor.

Representative of existing directory list formats is the display that can be invoked using Microsoft's Windows NT Explorer®, which presents a list by name of directories on a left window of the screen, and a list by name of files/documents in a user-selected one of the directories, on a right window of the screen. The list of files/documents includes the names, along with information such as file/document type, size, and date of last edit. The user then scrolls through the list, which can include thousands of files/documents, until the user recognizes a name of a file/document the user desires to open.

As recognized herein, the above-described conventional directory list format has certain drawbacks. Specifically, it is frequently the case that a user might desire to recall a particular document that has been stored in the user's file system, but the user might not know the exact name of the file or document. The present invention recognizes, however, that if the document contains visual data, for example, is a Power Point® presentation or a text document with embedded images, the user might quickly recognize the

document if the user could view a visual summary of the document, which unfortunately the user currently cannot conveniently do.

Consequently, to see easily recognizable visual data in files and documents, the user, as understood herein, would have to scroll through perhaps thousands of names on the list and sequentially open the files/documents until the visual datum being sought is found. This is time consuming and cumbersome. Nonetheless, it is the only means available for a user who, for example, desires to avoid creating a new presentation slide from scratch by instead creating a slide using a previously-generated slide that the user knows to be in the file system, but that might be stored under a name that the user cannot precisely recall. So-called thumbnail image browsers cannot remedy the above prior art shortfall, because thumbnail image browsers simply present a table of thumbnail images of images in non-document files formatted as, e.g., gif or jpg files. As stated above, such files make up only a fraction of the files and documents typically stored in a desktop file system. Additionally, thumbnail image browsers are not intended to and in fact do not provide the functionality of a directory listing GUI.

U.S. Pat. No. 5,060,135 discloses a data processing system that presents detailed miniaturized images of documents that are stackable on each other, for identification of documents by a user. The '135 system, however, is seemingly directed only to alpha-numeric (word processing) documents, and consequently does not address providing a GUI for a desktop system including image documents. Thus, among other things, the '135 system does not provide a means for easily searching for images that are similar to a desired image in a document. Moreover, the '135 patent does not provide an image-based GUI that is hierarchical in nature. As understood by the present invention, presenting an image content-based GUI that facilitates image searching and that is hierarchically based for ease of use is desirable. Likewise, U.S. Pat. No. 5,731,813 presents "snapshots" of screen displays in a seemingly non-hierarchical format, without the capability of image searching.

Fortunately, the present invention recognizes that visual data in file system documents can be used to present an effective, visual content-based directory list that a user can quickly scan to recall a particular visual datum, even if the user does not remember the associated name. Moreover, the present invention recognizes that it is possible to provide a directory list in which a user can identify a visual datum in a file system that contains visual data that is "close" to desired visual data and to cause similar visual data in the file system to be quickly and efficiently presented. The present invention also recognizes that it is possible to provide a natural multi-level hierarchy in presenting visual summaries of documents with visual data, from a single visual summary per document, to multiple visual summaries for each image of visual data instance in a document. Still further, the present invention recognizes that it is possible to provide a visual data-oriented directory list that can be combined with conventional file system features.

**SUMMARY OF THE INVENTION**

The invention is a general purpose computer programmed according to the inventive steps herein to present a graphical user interface (GUI) directory display on a monitor of a computer. The invention can also be embodied as an article of manufacture—a machine component—that is used by a digital processing apparatus and which tangibly embodies a program of instructions that are executable by the digital

processing apparatus to undertake the present invention. This invention is realized in a critical machine component that causes a digital processing apparatus to perform the inventive method steps herein.

In accordance with the present invention, the invention includes a computer incorporating a graphic user interface to desktop data or network-accessible data, with the data including at least some documents storing one or more respective visual data. The visual data can include images, graphs, charts, spreadsheets, slides, Web pages, word processing data with embedded images, videos, and the like. The computer includes computer readable code means for generating a respective visual summary of the visual data, such as thumbnails for images or filmstrips, animated images, or storyboards for video data. Computer readable code means are provided for receiving a user request for a listing of documents. In response to the user request, computer readable code means present a display including plural of the visual summaries presented simultaneously with each other.

In a preferred embodiment, computer readable code means receive a user request for visual data that is visually similar to a user-selected visual summary. In response, computer readable code means present visual summaries of similar visual data. The similar visual data can be retrieved from the same directory, or from a set of directories, or indeed from the full set of files on the computer or network, as controlled by the user. Additionally, at least some of the visual summaries are associated with respective application programs, and the computer further includes computer readable code means for invoking an application program when a user selects the associated visual summary.

As disclosed in detail below, the visual summaries can be presented in a hierarchy. At least an upper level in the hierarchy includes a visual summary of a single visual datum in the respective document to represent the entire document. Additionally, at least a lower level in the hierarchy includes visual summaries of each visual datum, for example, each slide of a presentation or each figure in each of the documents. Moreover, because a single image or figure can be composed of multiple subimages such as clip art images, the hierarchy includes a lowest level including visual summaries of the individual subimages in the documents.

In accordance with the present invention, the files and documents for which visual summaries are generated include images, presentation slides, spreadsheet charts, saved Web pages, documents that incorporate figures, and other visual data noted above. Furthermore, the present invention envisions generating visual summaries for documents that include alpha-numeric data having no visual data. For these text-only documents, a respective visual summary is generated that is representative of the appearance of the document, for example, a reduced image of a portion of a first page of the document.

In another aspect, in a computer having access to a system of files or other database containing at least documents, and also having access to one or more input devices for generating user requests for one or more lists of documents in the file system, a system is disclosed for presenting, on a monitor associated with the computer, a display representative of the documents. The system includes computer readable means executable by the computer for presenting plural visual summaries on the monitor in response to the user requests. Per the present invention, the summaries are derived from the documents, unlike conventional icons, the

particular visual appearances of which are not derived from documents. In other words, the visual summaries of the present invention, unlike conventional icons, are individually representative of the respective documents, that is, the visual summaries are not generic icons, but are derived from visual data in such a way so as to allow the user to recognize the visual summary as representing the parent visual data. The summaries may also represent additional document properties such as file type (word processing file, slide file, photographic image file, etc.), and size by image attributes such as type of border, corner tab, inset, etc.

In still another aspect, a computer-implemented method is disclosed for presenting a graphic user interface on a monitor of a computer. The present method includes extracting at least one visual summary per document for plural documents accessible to the computer, and then presenting the visual summaries on the monitor when a user of the computer generates a request for a list of computer documents. An application program associated with a document is invoked when a user of the computer associates one of the visual summaries with an application request.

In yet another aspect, a computer program device includes a computer program storage device that is readable by a digital processing apparatus. A program means is on the program storage device, and the program means includes instructions executable by the digital processing apparatus for performing method steps for presenting a graphical list of computer documents on a monitor of a computer. These method steps include generating a respective visual summary of at least a portion of at least some of the documents, and receiving a user request for a listing of documents. The method steps further include presenting a display in response to the receiving step, wherein the display includes plural of the visual summaries presented simultaneously with each other.

In another aspect, a computer program device includes program means on a program storage device that includes instructions which are executable by a digital processing apparatus for performing method steps for presenting visual data on a computer display as a list representative of computer documents containing the visual data. Importantly, the visual data are derived from the respective documents. A user request for visual data similar to a user-selected visual datum on the list is received, and at least portions of similar visual data are then presented in response to the user request. Moreover, an application is invoked in response to the selection of a visual datum.

The details of the present invention, both as to its structure and operation, can best be understood in reference to the accompanying drawings, in which like reference numerals refer to like parts, and in which:

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic diagram showing the system of the present invention;

FIG. 2 is a schematic diagram showing a computer program product of the present invention;

FIG. 3 is a flow chart showing the logic for generating visual summaries;

FIG. 4 is a flow chart showing the logic for presenting the present GUI display;

FIG. 5 is a diagram of one GUI display as would be seen on a computer display device; and

FIG. 6 is a diagram of an alternate GUI display as would be seen on a computer display device.

DETAILED DESCRIPTION OF THE  
PREFERRED EMBODIMENTS

Referring initially to FIG. 1, a system is shown, generally designated 10, for accessing, via a path 11, a file system 12 for generating a graphical user interface (GUI) directory display. The file system may reside, for example, in desktop form that is local to a digital processing apparatus, such as a computer 14, in which case the file system 12 is internal to the computer 14 and the path 11 is an internal computer data bus. Or, the file system 12 can be remote from the computer 14, in which case the path 11 can be a local area network (LAN) or wide area network (WAN) such as the Internet and the file system is network-accessible. In one intended embodiment, the computer 14 is a desktop computer such as a personal computer or laptop computer made by International Business Machines Corporation (IBM) of Armonk, N.Y. Alternatively, the computer 14 may be any computer, including computers sold under trademarks such as AS400, with accompanying IBM Network Stations. Or, the computer 14 may be a Unix-based computer, or OS/2-based server computer, or Windows NT-based server computer, or IBM RS/6000 250 workstation or other equivalent device.

It is to be understood that while the embodiment described herein focusses on a desktop file system as a whole, the present invention can be incorporated in a single application program, e.g., a slide generation application program, in which case the files addressed by the present invention might not be the entire desktop file system that is accessible to the host computer, but rather the files associated with the particular application program incorporating the present invention.

As shown in FIG. 1, the computer 14 is electrically connected to one or more input devices, e.g., a mouse 16, a keyboard 18, or other input device such as a touchpad, trackball, or voice activated input device, which can be actuated by a user of the system 10 to generate requests for directory listings. The computer 14 also accesses one or more output devices such as a printer 20 and a monitor 22 that are conventionally coupled to the computer 14. It is to be understood that the monitor 22 is a cathode ray tube, flat panel display, or other appropriate visual display device. In any case, the present invention generates a GUI display for presentation on the screen 22a of the monitor 22.

In accordance with the present invention, the file system 12 is essentially a database that holds electronic files and documents of various types, including visual data documents (mixed text and visual documents), visual image files and text only documents. Visual data files are files that contain one or more images such as photographs or video frames, whereas visual data documents contain not only visual data such as images, drawings, presentation charts, and the like, but can contain editable alpha-numeric data as well. Text-only documents, in contrast, are documents such as word processing documents and text-only electronic mail (email) documents that generally do not contain data sets representative of visual data, such as images.

With the above in mind, a visual summary module 24 communicates with the file system 12 and computer 14 via data paths 25 to present, on the monitor 22, visual summaries derived from documents (and files) within the file system 12. The visual summary module 24 presents the visual summaries as a GUI display in response to a user generating a directory list request or document list request using the mouse 16 or keyboard 18. As intended herein, a visual summary is a digital image that is derived in accor-

dance with principles known in the art from a parent visual datum, with the visual summaries containing a fraction of the information in the parent visual data. For example, commercial products are currently available that extract figures from documents, pages from slide presentations, and so forth, and store them as individual image files. From these, the present visual summaries can be made.

As a simple example, a visual summaries might contain only every third pixel in a parent visual datum. The visual summaries can be established by thumbnails for images or filmstrips, by animated images, or by storyboards or indeed portions of a word processing document page for other types of visual data.

Additionally, in the preferred embodiment an visual data search engine 26 communicates with the file system 12 and computer 14 via search paths 28. As disclosed in detail below, the visual data search engine 26 is a software-based search engine that receives a user-designated visual datum and in response searches for visual data that are similar to the user-selected datum. Preferably, the visual data search engine 26 includes the engine disclosed in U.S. Pat. No. 5,579,471, invented by the present inventor, owned by the present assignee, and incorporated herein by reference.

It is to be understood that the control components such as the visual summary module 24 and visual data search engine 26 can be implemented in software contained in an appropriate electronic data storage, e.g., a hard disk drive 30 and/or optical disk drive 32, that are conventionally coupled to the computer 14. Or, the control components can be embodied in other logical components such as a computer diskette 34 shown in FIG. 2. The diskette 34 shown in FIG. 2 has a computer usable medium 36 on which are stored computer readable code means (i.e., program code elements) A-D.

The flow charts herein illustrate the structure of the visual summary module of the present invention as embodied in computer program software. Those skilled in the art will appreciate that the flow charts illustrate the structures of logic elements, such as computer program code elements or electronic logic circuits, that function according to this invention. Manifestly, the invention is practiced in its essential embodiment by a machine component that renders the logic elements in a form that instructs a digital processing apparatus (that is, a computer) to perform a sequence of function steps corresponding to those shown.

In other words, the visual summary module 24 may be a computer program that is executed by a processor within the computer 14 as a series of computer-executable instructions. In addition to the drives 30, 32, these instructions may reside, for example, in RAM of the computer 14, or the instructions may be stored on a DASD array, magnetic tape, electronic read-only memory, or other appropriate data storage device. In an illustrative embodiment of the invention, the computer-executable instructions may be lines of compiled C++ compatible code.

Now referring to FIG. 3, the logic used by the visual summary module 24 in generating visual summaries for use in the novel GUI display can be seen. Commencing at decision diamond 38, it is determined whether it is time to scan the file system 12 for newly added documents. Thus, the file system 12 is periodically monitored for new documents to update the GUI directory, and if the logic determines that it is time to scan the file system 12, the logic enters a "DO" loop at block 40 for each new document, i.e., for each document not previously considered by the visual summary module 24. It is to be understood that the visual

summary module 24 alternatively can continuously update the GUI directory, if desired, in which case the "DO" loop at block 40 is entered each time a new document is created.

Proceeding to block 42, the logic determines what type of file or document the test document or file is. If it is an image file, e.g., a gif-formatted file or a jpg-formatted file, the logic moves to block 44 to generate a thumbnail of the image, in accordance with visual summary generation principles known in the art, as the visual summary of the underlying visual data in the file.

On the other hand, if the document is a presentation documents, e.g., a Microsoft Power Point®-formatted document or a Lotus Freelance®-formatted document, the logic moves to block 46 to generate thumbnail-like visual summaries of each slide in the document. The logic then moves to block 48 to designate one of the visual summaries to be a document visual summary that represents the file or document in the highest level of a visual summary hierarchy. In one preferred embodiment, the visual summary of the first visual datum in the file or document is designated as the file or document summary, although other designation schemes can be used. For example, the visual summary of the first or largest visual datum in the file/document can be designated as the file/document visual summary. In any case, the remaining visual summaries of the visual data in a file/document establish a second level in a visual summary hierarchy. The present invention understands that such a hierarchical system is natural for many image-based documents.

In contrast, if the document under test is a word processing document, the logic moves to block 50 to generate a visual summary that is representative of the appearance of the document. For example, if the document is a letter, the visual summary generated at block 50 might be an image of the top half of the first page, showing the letterhead of the document as well as the addressee. In any case, the actual appearance of each visual summary generated at block 50, like the appearances of the other visual summaries generated in accordance with present principles, is derived from the content of the document under test. From block 50, the process moves to block 52, wherein visual summaries are generated of any embedded images in the document.

Alternatively, the document/file under test might be a markup file, such as a hypertext markup (HTML) file, in which case the process moves to block 53 to generate a visual summary of the file. Or, the document/file under test might be a video file, in which case the process moves to block 54 to generate a visual summary of the file, e.g., a thumbnail of the first frame of the file, a thumbnail of every 100<sup>th</sup> frame, etc.

After visual thumbnail generation, the logic moves to block 56 to store the visual summaries, along with the properties of the respective documents from which the visual summaries were derived and, if desired, predetermined text. The document properties can include document type (i.e., what type of application program was used to generate the document), date of last edit, and so on. The predetermined text can be alpha-numeric characters representing one or more of the document properties, with selected text being superimposed on the associated visual summary during presentation. Further, to the extent that certain data (e.g., meta data, search data, etc.) is required by the visual data search engine 26 during subsequent user-requested searches, such data can be stored with the visual summary at block 56. At block 58, the next new document is retrieved, and the process then loops back to decision diamond 42 as shown.

Now referring to FIGS. 4 and 5, the presentation and operation of the GUI display can be appreciated. Having generated visual summaries of files and documents as described above, a user of the computer 14 can cause a graphic directory or list to be presented on the screen 22a of the monitor 22 as follows. At block 60 of FIG. 4, the user can invoke a directory listing using well-known principles by appropriately manipulating the mouse 16 or keyboard 18.

In response to the user request for one or more lists of 10 directories and/or files/documents in the file system 12, the visual summary module 24 presents, on the monitor 22, a display representative thereof. Such a display is shown in FIG. 5 and generally designated 62. As shown, the display 62 is a GUI display that includes plural visual summaries 64 presented simultaneously with each other. As indicated in 15 FIG. 5, a first one 64a of the visual summaries 64 is a visual summary of a digital photograph that has been stored in its associated document, while a second one 64b of the visual summaries 64 is a visual summary of a video frame from a 20 digitally-stored video. Yet again, a third one 64c of the visual summaries 64 is a visual summary of a slide that has been stored in its associated document, while a fourth one 64d of the visual summaries 64 is a visual summary of the top half of the first page of a text-only document.

25 Still further, a fifth one 64e of the visual summaries 64 is a visual summary of a presentation slide that has been stored in its associated document, whereas a sixth one 64f of the visual summaries 64 is a visual summary of a hypertext markup language (HTML) page that has been, e.g., downloaded from the World Wide Web. A sixth visual summary 64g can be a visual summary of an embedded image in an email document, and a seventh visual summary 64h is a visual summary of a history of Web pages that have been 30 viewed using the computer 14.

35 It may now be appreciated that a user viewing the GUI display shown in FIG. 5 can readily ascertain the nature of the visual data in each file/document by looking at the display 62. The user can quickly scroll through the visual summaries shown by using a scroll bar 66 on the display 62.

40 In the embodiment shown, a top level of visual summaries in a hierarchy is shown; accordingly, each visual summary 64 represents a respective document, with the highest level of visual summaries being initially displayed as indicated at block 67 in FIG. 4. If desired, the user can manipulate a level down button 68 to cause a set of visual summaries to be displayed that represents a second level of the hierarchy. In one preferred embodiment, the second level in the hierarchy includes visual summaries of each visual datum in a document or documents that are selected by the user, for example, 45 each slide in a Microsoft Power Point® presentation, or each individual figure embedded in a Microsoft Word® document. To select the document or documents, the user can manipulate the mouse 16 to "click" on a visual summary or 50 visual summaries in the highest level, with the next lower level of visual summaries in the hierarchy being displayed 55 when the user clicks on the level down button 68.

The user can click yet again on the level down button 68 to cause yet a lowest level of visual summaries in the 50 hierarchy to be presented. In one embodiment, the lowest level of visual summaries represent individual component images, i.e., subimages such as clip art, that make up a single figure. The lowest level of visual summaries is generated for each subimage of each document in the selected document or documents. As another example, a figure in a Word® document may be composed of several clip art images composed together, and this third level would display a 55

visual summary of each individual clip art image. A level up button 70 is provided to enable a user to move from a lower level of visual summaries in the hierarchy to a higher level. The above-described steps are represented at block 72 in FIG. 4.

As shown in FIG. 5, each visual summary 64 includes a respective "full image" bar 74 and a respective "information" bar 76. A user can manipulate the mouse 16 to click on the "information" bar 76 to cause alpha-numeric file information, e.g., document name, date of last edit, and so on to be presented with the selected visual summary or superimposed on the visual summary 64, as indicated at block 78 in FIG. 4. In contrast, the user can click on the "full image" bar 74 of a visual summary 64 to cause the full visual datum from the associated document to be displayed at block 80 in FIG. 4. If desired, each visual summary 64 can include a respective document type header bar 82, indicating the type of document represented by the respective visual summary 64.

From block 80, the logic moves in response to user commands to blocks 82 and/or 84 in FIG. 4. More specifically, at block 82 a user can invoke an application program that had been used to create a document by double clicking or otherwise selecting the respective visual summary 64 in FIG. 5. In this way, the application program is invoked, and then the document associated with the selected visual summary 64 is opened by the application program, in an easy and user-friendly way. Additional document listing functionality can also be provided, e.g., by combining the display with conventional document sorts by date, or by size, or by name, and so on.

Also, if desired the user can select a visual summary 64 and then click on an image search button 86 on the display 62 to invoke the visual data search engine 26. As described in the above-referenced patent, the visual data search engine 26 accesses the file system 12 to search for and return, in order of similarity, visual data from files and documents in the file system 12 that are similar to the selected visual summary 64. The search can be restricted to images in the same directory, a set of directories, the full file system, or other set of files. These similar visual data are then presented on the display 62. With this logic, a user can identify a visual summary that is similar to a visual datum being sought that the user knows or suspects is stored in the file system 12, with similar visual data being returned to the user without requiring the user to scroll through the display 62. FIG. 5 shows that the above-mentioned image search feature can be combined with a word search window 88, whereby a user, in addition to selecting a visual datum to be matched as described above, can also input an alpha-numeric string for undertaking a conventional word search, in conjunction with the image search, to narrow the scope of the search.

If desired, a size limit button 90 can be provided on the display 62. A user can toggle the size limit button 90 to limit the size of documents, particularly HTML documents and gif-formatted documents, that are listed by means of the visual summaries 64 on the display 62.

FIG. 5 shows that alternatively to the "full image" bars 74 and "information" bars 76, a user can click on a visual summary 64 to cause a drop-down menu 92 to be displayed. As shown, the drop-down menu 92 can include a full image button 94 and an information button 96 that are analogous to the bars 74, 76 discussed above. Also, an image search button 98 can be provided on the menu 92, in lieu of the search button 86, and a text search button 100 can be provided in lieu of the word search window 88.

Additional file system functionality can be invoked using the menu 92. For example, an "open" button 102 can be selected to open a file/document. Furthermore, a cut/copy button 104, delete button 106, and rename button 108 can be provided to function in accordance with conventional principles. If desired, additional file system functionality can be provided using, e.g., the menu 92.

FIG. 6 shows a GUI display, generally designated 110, that is configured differently than the display 62 shown in FIG. 5. More specifically, as shown the display 110 in FIG. 6 lists conventional alpha-numeric file/document data, including name in a name column 112, size in a size column 114, file/document type in a type column 116, date of last edit in a date column 118, and time of last edit in a time column 120. In each file/document row, however, a respective visual summary 122 is presented in accordance with the principles set forth herein. A visual summary 122 can be selected to open the associated file/document, or to display a menu such as the menu 92 shown in FIG. 5.

20 While the particular COMPUTER FILE DIRECTORY SYSTEM DISPLAYING VISUAL SUMMARIES OF VISUAL DATA IN DESKTOP COMPUTER FILES FOR QUICKLY IDENTIFYING FILE CONTENT as herein shown and described in detail is fully capable of attaining the above-described objects of the invention, it is to be understood that it is the presently preferred embodiment of the present invention and is thus representative of the subject matter which is broadly contemplated by the present invention, that the scope of the present invention fully encompasses other embodiments which may become obvious to those skilled in the art, and that the scope of the present invention is accordingly to be limited by nothing other than the appended claims, in which reference to an element in the singular means "at least one" unless otherwise recited.

I claim:

1. In a computer having access to a file system of documents and one or more input devices associated with the computer for generating user requests for one or more lists of documents in the file system, a system for presenting, on a monitor associated with the computer, a display representative of the documents, comprising:

45 computer readable means executable by the computer for presenting plural images on the monitor in response to the user requests, the images being derived from the documents, wherein the images are visual summaries of file system images having associated documents, and wherein the visual summaries can be presented in a hierarchy, at least an upper level in the hierarchy including a visual summary of a single representative image in the respective document, at least a lower level in the hierarchy including plural visual summaries of respective plural images other than the representative image in the respective document.

55 2. The system of claim 1, further comprising computer readable code means for causing the computer to retrieve images similar to a selected image.

3. The system of claim 1, wherein the lower level includes a visual summary of each image in the respective document, and wherein the hierarchy includes a lowest level including visual summaries of at least one component image in at least one image in the respective document.

4. The system of claim 3, wherein the documents include images, presentation slides, spreadsheet charts, saved Web pages, and documents that incorporate figures.

\* \* \* \* \*

UNITED STATES PATENT AND TRADEMARK OFFICE  
CERTIFICATE OF CORRECTION

PATENT NO. : 6,181,342 B1  
DATED : January 30, 2001  
INVENTOR(S) : Niblack

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page.

Name of Assignee: International Business Machines Corporation  
Residence: Armonk, New York

Signed and Sealed this

Twenty-fifth Day of December, 2001

Attest:



Attesting Officer

JAMES E. ROGAN  
Director of the United States Patent and Trademark Office

United States Patent [19]  
Warrin

[11] Patent Number: 5,640,522  
[45] Date of Patent: Jun. 17, 1997

[54] METHOD AND SYSTEM FOR PREVIEWING  
TRANSITION EFFECTS BETWEEN PAIRS  
OF IMAGES

[75] Inventor: Paul Warrin, Sunnyvale, Calif.

[73] Assignee: Microsoft Corporation, Redmond,  
Wash.

[21] Appl. No.: 349,372

[22] Filed: Dec. 5, 1994

[51] Int. Cl.<sup>6</sup> G06F 3/14

[52] U.S. Cl. 395/346; 395/334; 395/348;  
395/135

[58] Field of Search 395/155, 157,  
395/159, 154, 152, 161, 135, 334, 333,  
346, 340, 342, 348-350, 326, 173, 174,  
960; 345/119, 115

[56] References Cited

U.S. PATENT DOCUMENTS

5,206,929	4/1993	Longford et al.	395/159
5,353,391	10/1994	Cohen et al.	395/161 X
5,359,712	10/1994	Cohen et al.	395/161
5,363,482	11/1994	Victor et al.	395/157
5,414,808	5/1995	Williams	395/154
5,416,900	5/1995	Blanchard et al.	395/155
5,491,778	2/1996	Gordon et al.	395/152 X
5,500,936	3/1996	Allen et al.	395/157 X

OTHER PUBLICATIONS

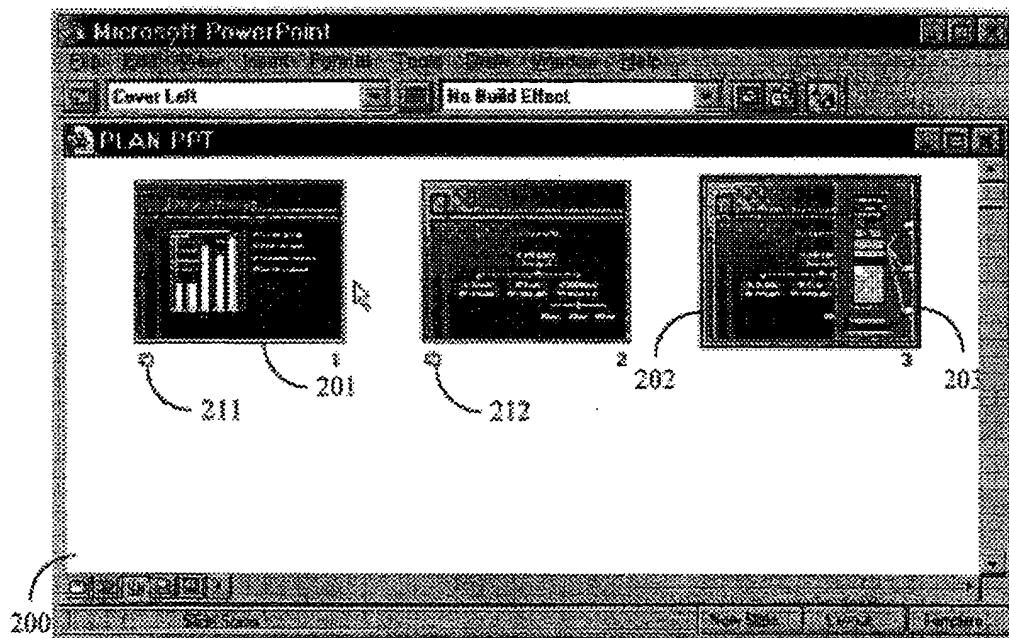
"Special Delivery Reference Manual", Interactive Media Corporation, 1992, pp. 25, 65, 67.

Primary Examiner—Raymond J. Bayerl  
Attorney, Agent, or Firm—Seed and Berry LLP

[57] ABSTRACT

A method and system for previewing transition effects between pairs of images is provided. In a preferred embodiment, a transition effect previewing program ("the previewing program") enables a user to preview a transition effect assigned to a pair of images within a presentation. The previewing program first displays in a display area both the source image and the target image. When the previewing program receives a previewing instruction from the user, the previewing program displays the source image in a preview position in the display area. The previewing program then applies the assigned transition effect to the source image displayed in the preview position in the preview area. In a further improved embodiment, the preview position corresponds to the position in which the target image is first displayed. In yet further preferred embodiments, the user may issue a previewing instruction by assigning a transition effect to a pair of images, or by selecting a transition effect indicator displayed in conjunction with a pair of images to which a transition effect has already been assigned.

19 Claims, 14 Drawing Sheets



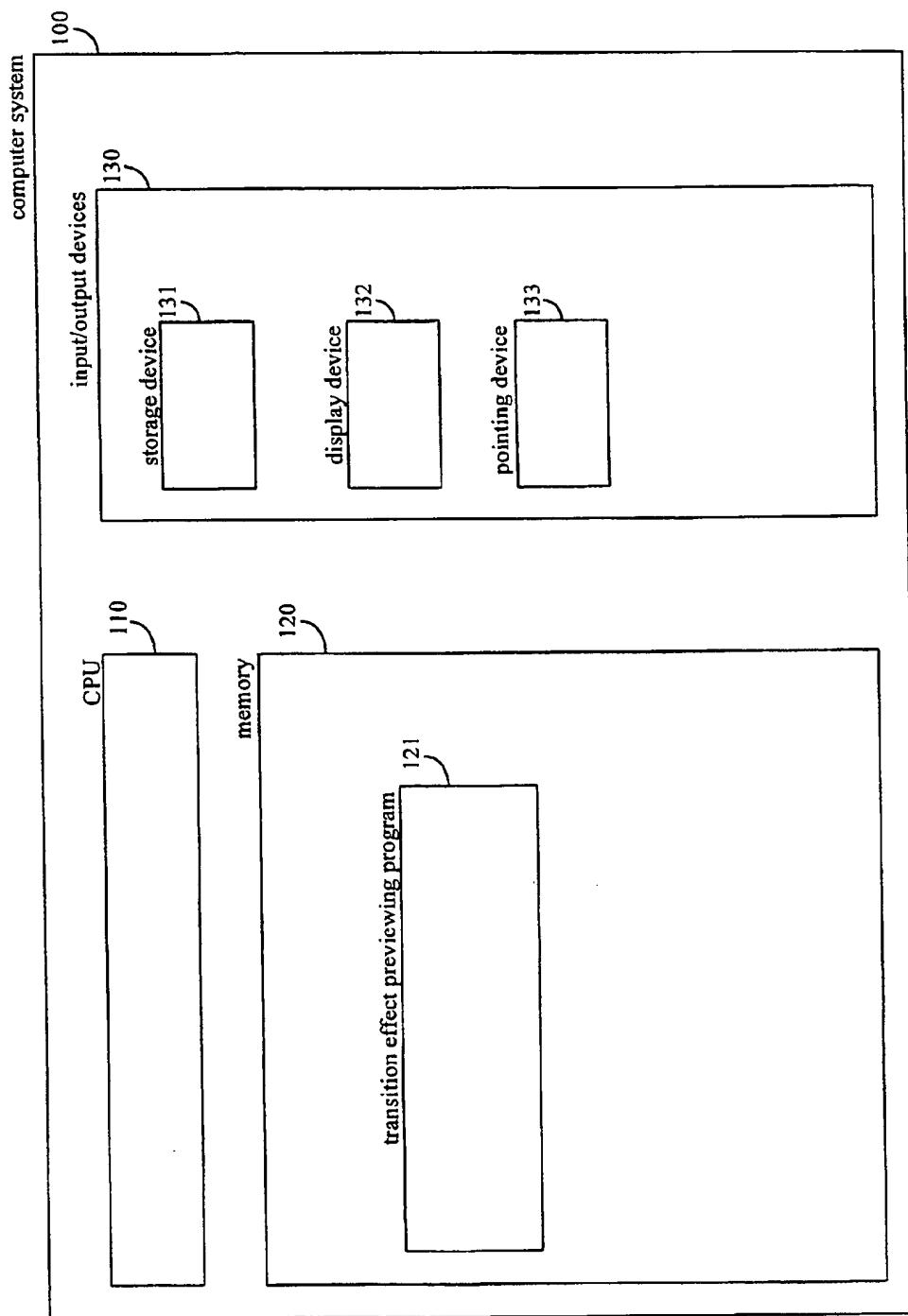
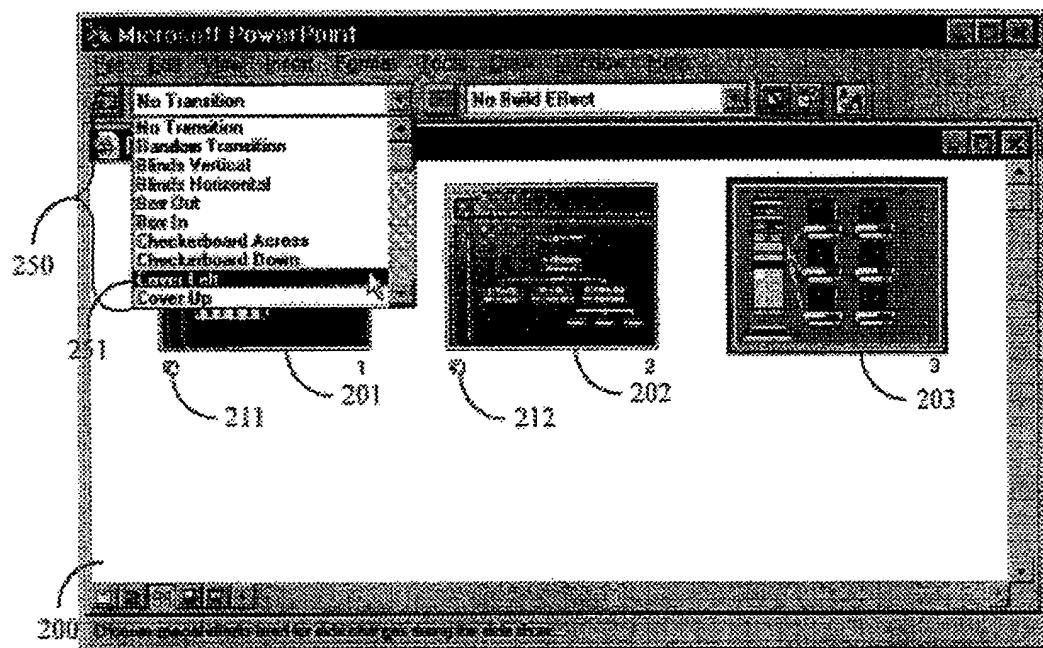
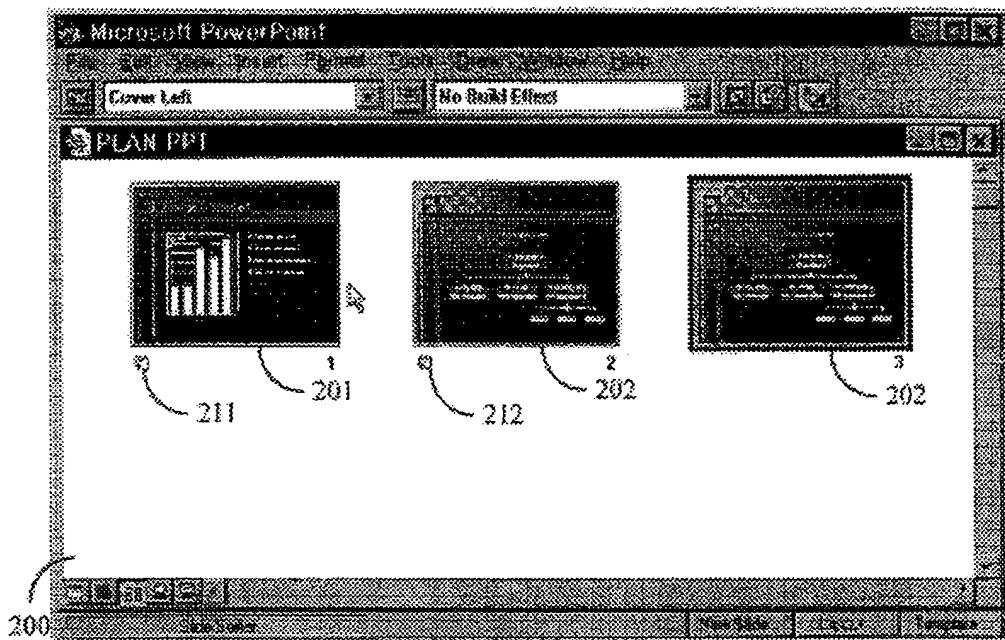


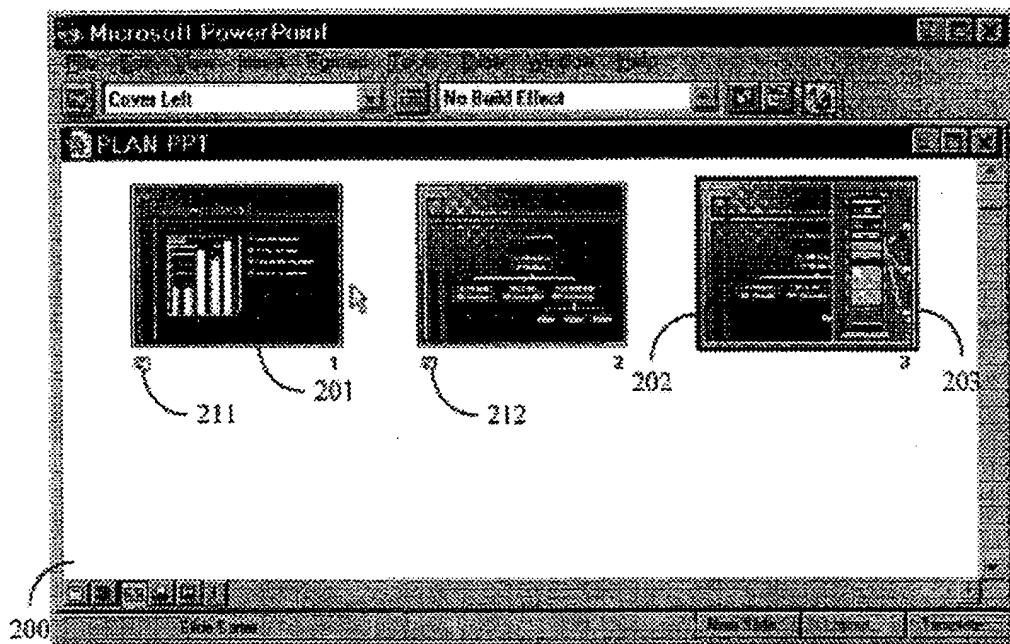
FIG. 1



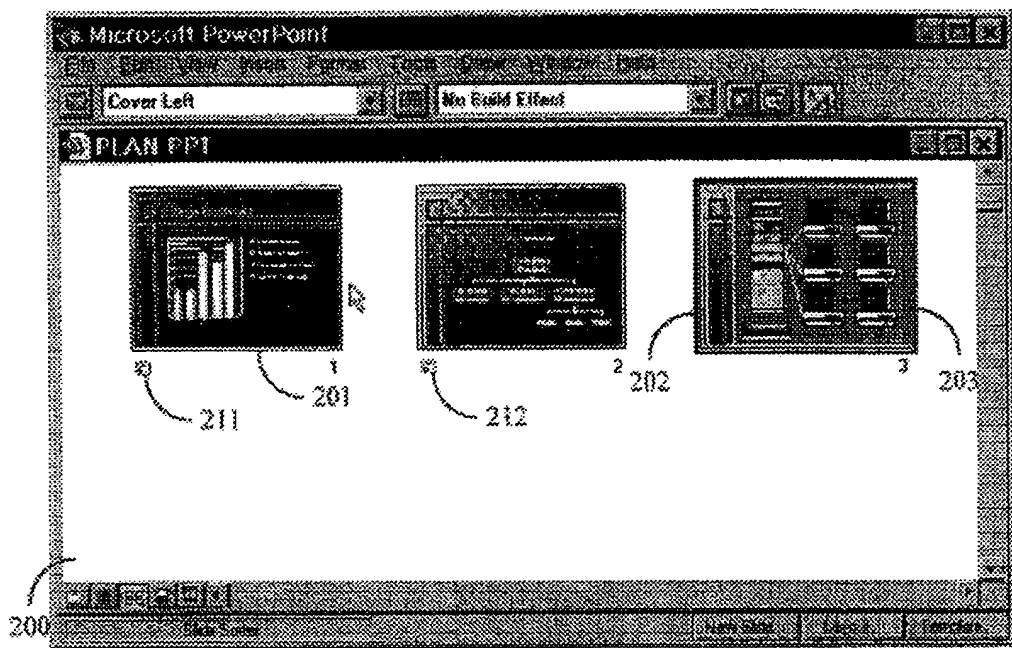
*FIG. 2A*



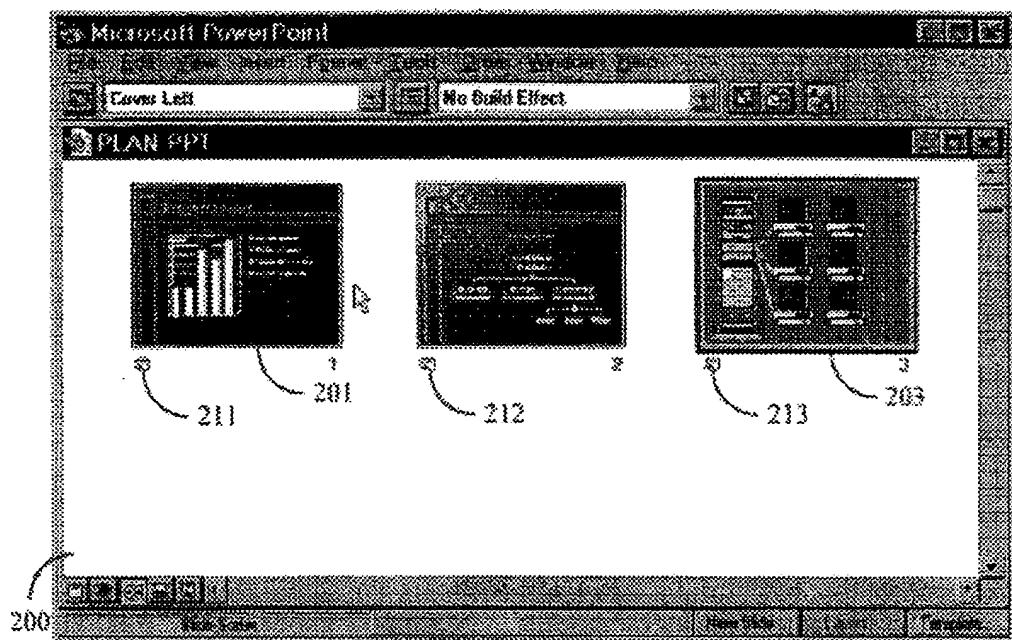
*FIG. 2B*



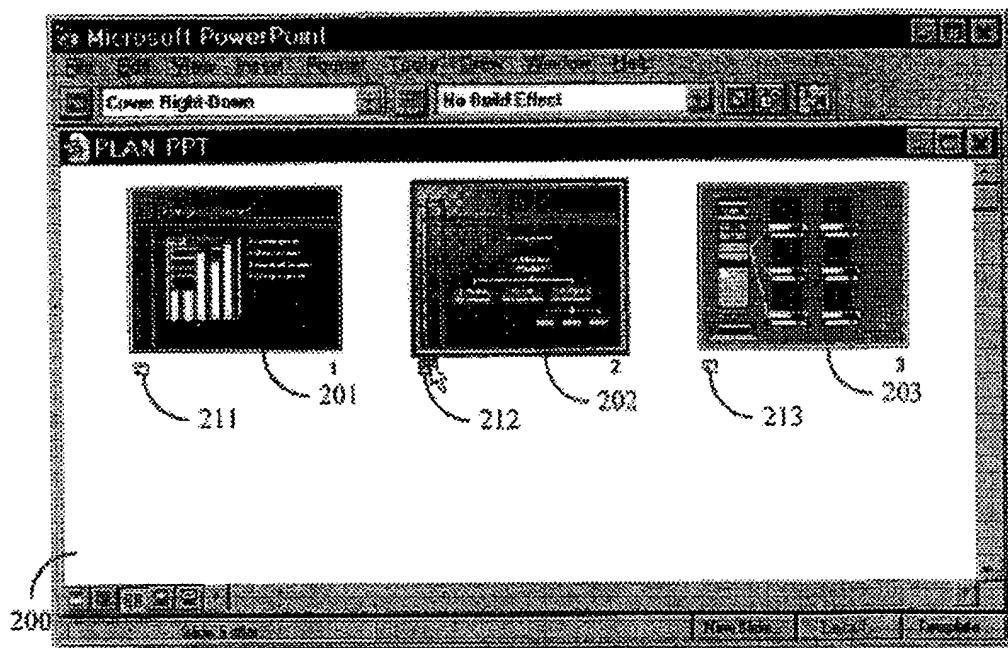
*FIG. 2C*



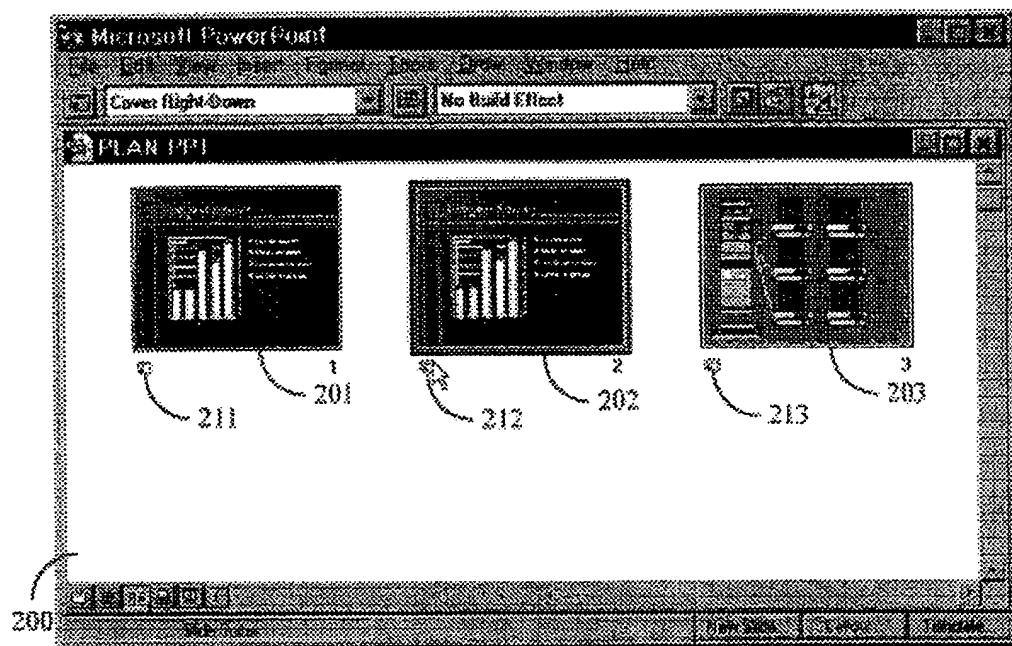
*FIG. 2D*



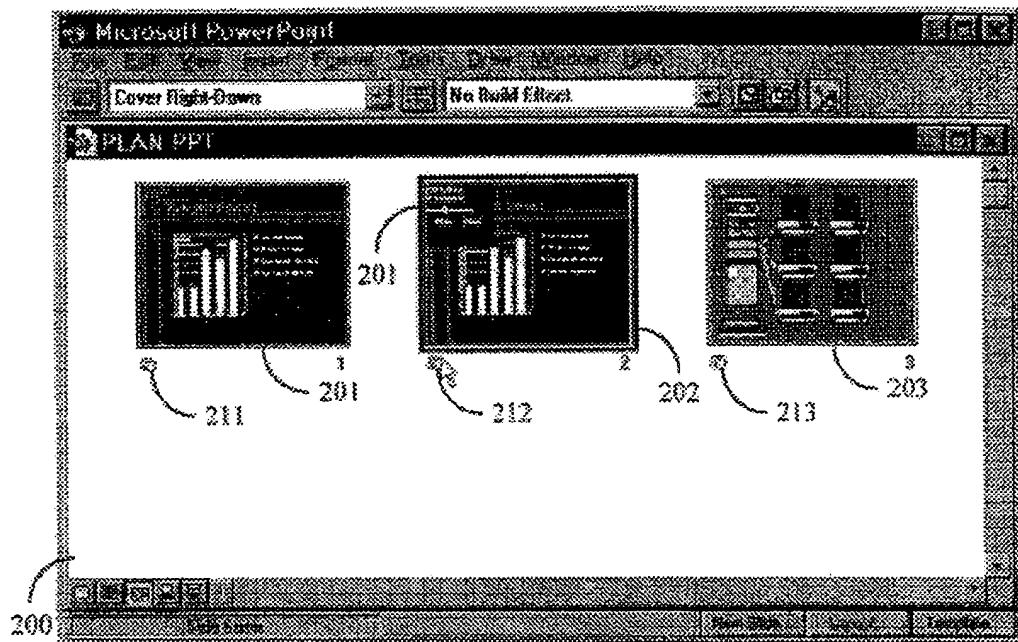
*FIG. 2E*



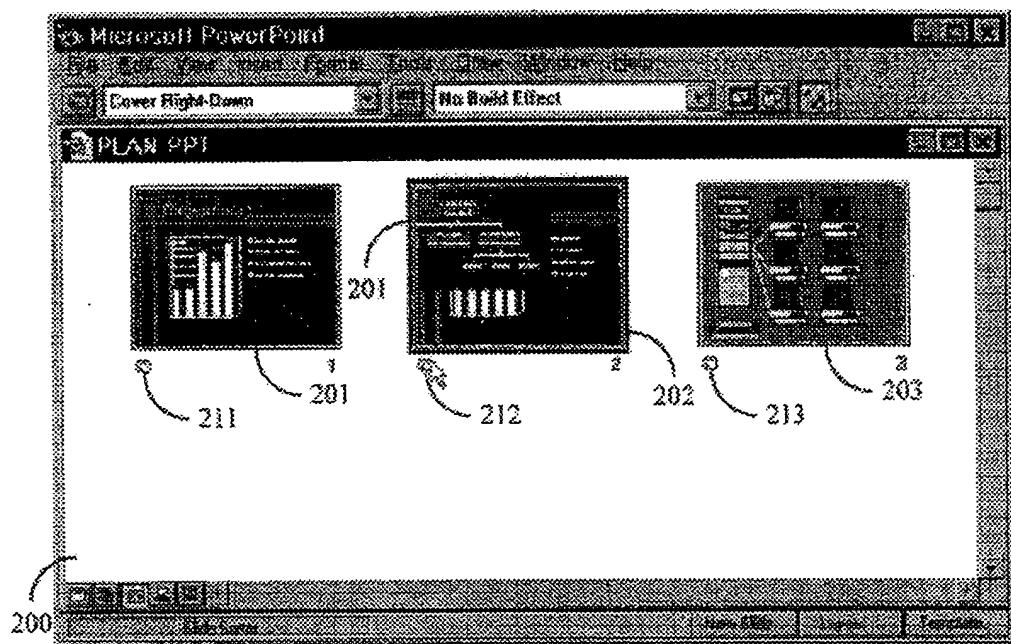
*FIG. 2F*



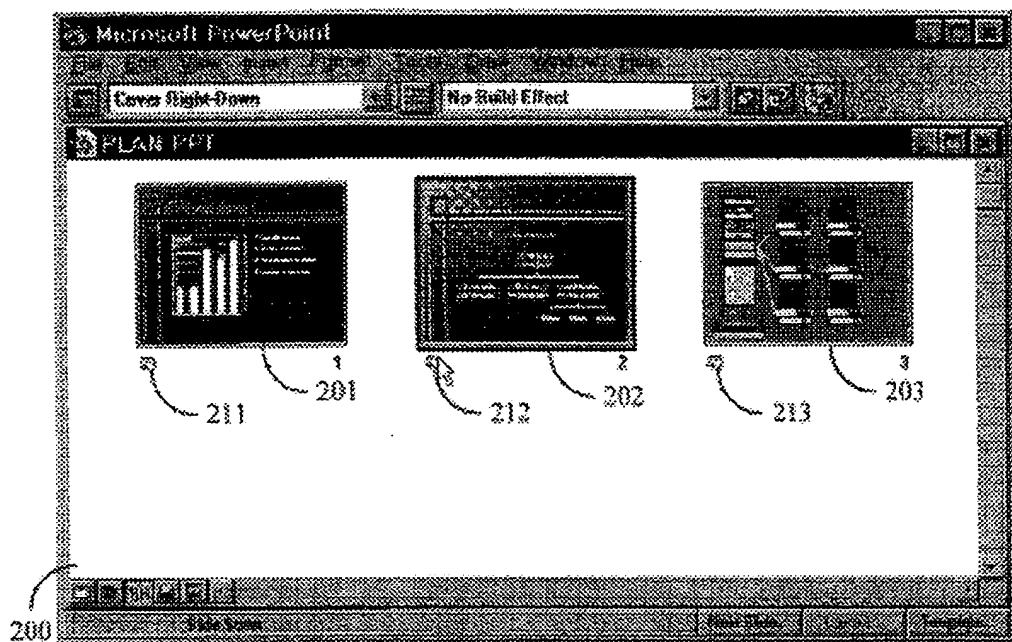
*FIG. 2G*



*FIG. 2H*



*FIG. 2I*



*FIG. 2J*

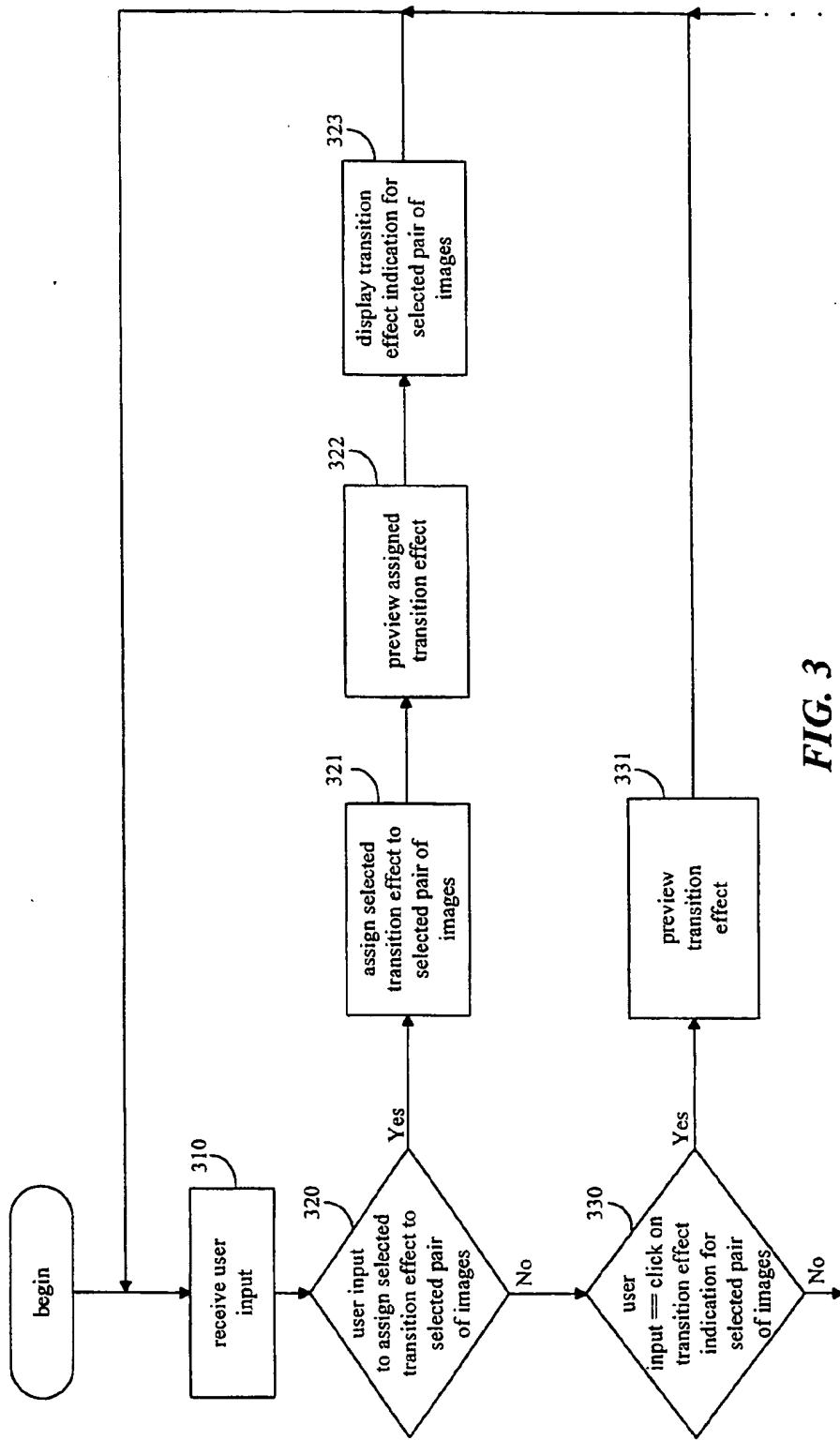
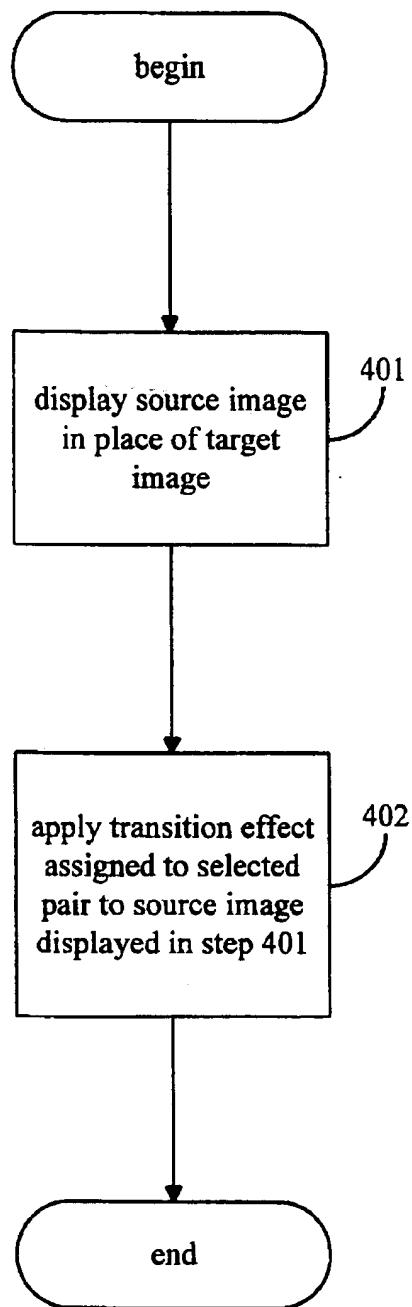
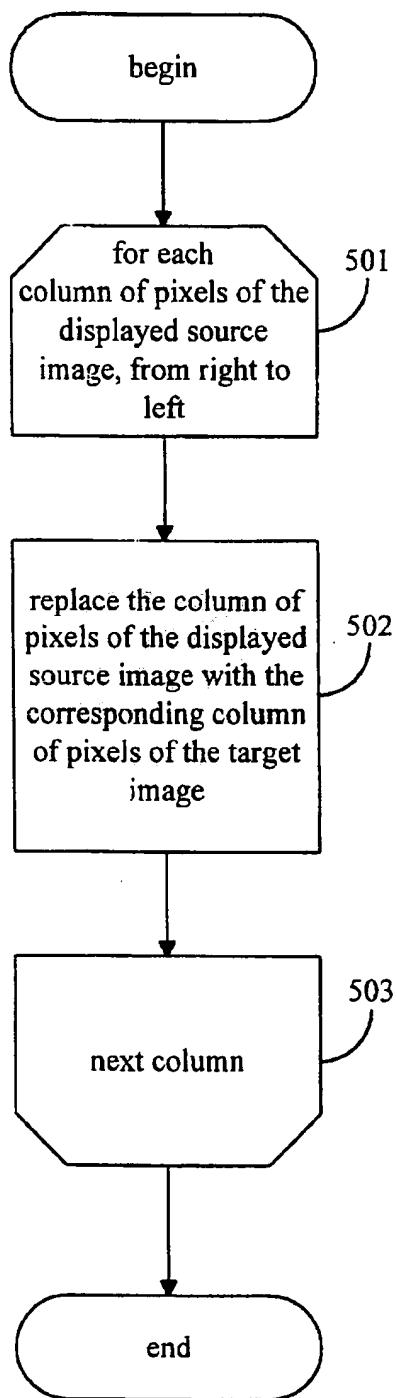


FIG. 3

***FIG. 4***

***FIG. 5***

**METHOD AND SYSTEM FOR PREVIEWING  
TRANSITION EFFECTS BETWEEN PAIRS  
OF IMAGES**

**TECHNICAL FIELD**

The invention relates generally to a method and system for designing visual presentations comprised of a series of images, and, more specifically, to a method and system for previewing transition effects between pairs of images.

**BACKGROUND OF THE INVENTION**

Modern presentation computer programs ("presentation programs") allow human users to use a general-purpose computer and an attached display device to design and present a slide show-type visual presentation ("presentation") comprised of a sequence of visual ("images"), or "slides." Typically, such presentation programs have a presentation editing mode in which users may design and revise presentations and a presentation mode in which users may present presentations. Presentation programs are useful because they enable a user who is not a graphic design artist to design a consistent, professional-looking visual presentation that can accompany and enhance a verbal presentation.

A user designs a presentation by interacting with the presentation program to prepare a set of images to be presented during the presentation. It is typical for the user to designate a particular linear sequence for the images to be presented in during the presentation. This can be characterized as creating a "link" from each image to the image that follows it in the sequence designated by the user. When the presentation is initiated, the images are presented in the designated sequence. From a particular current image being displayed, the presentation program presents the next image in the designated sequence, following the link from the current image, either (a) after a designated period of time has passed since the current image was presented or (b) when the user operates a "next image" control.

In some presentation programs, the visual transition from a current image to the image that follows it in the designated sequence (or "next image") is arbitrary. For example, often each row of pixels of the current image is replaced with the corresponding row of pixels of the next image, from top to bottom, as quickly as possible. Other presentation programs utilize a more sophisticated approach, according to which the user may designate that transitions between adjacent images are to be performed using special "transition effects". A transition effect is a graphical technique for visually depicting the transition from a source image to a target image. Transition effects generally involve either: (1) replacing portions of the current image with the corresponding portions of the next image according to some pattern, e.g., a checkerboard pattern; (2) progressively shifting one of the two images relative to the other, e.g., shifting the current image progressively to the right to reveal the next image "underneath"; or (3) manipulating brightness values in the palette used to display the images, e.g., making the current image appear to recede into darkness, then making the next image appear to emerge from darkness.

Some presentation programs allow the user to view demonstrations of different transition effects when the user is selecting a transition effect for a particular pair of images. Such demonstrations are performed using a "sample" current image and a "sample" next image. While such demonstrations may help the user to appreciate the general nature of different transition effects, the use of standard sample

images makes it difficult to determine how the transition effect will look when applied to a particular pair of the actual images used in a presentation.

Typically, the user cannot assess the effect of assigning a particular transition effect to a particular pair of images used in a presentation without using the presentation mode of the presentation program to view the entire presentation at full size. This can be inconvenient, especially in cases where the user is experimenting with different transition effects for a particular pair of images.

**SUMMARY OF THE INVENTION**

The invention provides a method and system for previewing transition effects between pairs of images. In a preferred embodiment, a transition effect previewing program ("the previewing program") enables a user to preview a transition effect assigned to a pair of images within a presentation. The previewing program first displays in a display area both the source image and the target image. When the previewing program receives a previewing instruction from the user, the previewing program displays the source image in a preview position in the display area. The previewing program then applies the assigned transition effect to the source image displayed in the preview position in the preview area. In a further improved embodiment, the preview position corresponds to the position in which the target image is first displayed. In yet further preferred embodiments, the user may issue a previewing instruction by assigning a transition effect to a pair of images, or by selecting a transition effect indicator displayed in conjunction with a pair of images to which a transition effect has already been assigned.

**BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a high-level block diagram of the general-purpose computer system upon which the previewing program preferably operates.

FIGS. 2A-2J are screen diagrams demonstrating the operation of the preview program.

FIG. 3 is an overview flow diagram showing the steps performed by the preview program.

FIG. 4 is a flow diagram showing the steps performed by the preview program in order to preview a transition effect.

FIG. 5 is a flow diagram showing the steps performed by the preview program in order to apply a sample transition effect.

**DETAILED DESCRIPTION OF THE  
INVENTION**

A method and system for previewing transition effects between pairs of images is provided. In a preferred embodiment, a transition effect previewing program ("the previewing program") enables a user to preview a transition effect assigned to a pair of images within a presentation, which preferably comprises an ordered sequence of images. A transition effect is a graphical technique for visually depicting the transition from a source image to a target image, and is preferably defined by a subroutine or set of parameters stored in conjunction with the previewing program that specifies how the transition effect is to be performed. The previewing program preferably has a presentation editing mode, in which several of the images of the presentation are displayed simultaneously at a size smaller than that at which they will be displayed during the presentation. In the presentation editing mode, the previewing program preferably enables the user to apply any of a

number of available transition effects to a pair of images that is adjacent in the sequence of the presentation by selecting a pair of images and selecting a transition effect to apply to the selected pair of images. When a user applies a transition effect to a pair of images, the previewing program preferably previews the assigned transition effect by replacing the target image of the selected pair with the source image of the selected pair, then applying the transition effect to that source image in order to visually transform it back into the target image. After the user has assigned a presentation effect to a pair of images, the previewing program displays a transition effect indicator, such as a small icon, in conjunction with a pair of images in the presentation editing mode. The user may preferably also preview any transition effect assigned to a pair of images by using a pointing device to select the transition effect indication displayed in conjunction with the pair of images.

FIG. 1 is a high-level block diagram of the general-purpose computer system upon which the previewing program preferably operates. The computer system 100 contains a central processing unit (CPU) 110, input/output devices 120, and a computer memory (memory) 130. Among the input/output devices 120 are a storage device 121, such as a hard disk drive; a display device 132, such as a video monitor; and a pointing input device ("pointing device") 133, such as a mouse. The previewing program 121 preferably resides in the memory 130 and executes on the CPU 110. While the previewing program is preferably implemented on a computer system configured as described above, one skilled in the art will recognize that it may also be implemented on computer systems having different configurations.

FIGS. 2A-2J are screen diagrams demonstrating the operation of the previewing program. These diagrams show the user interacting with the previewing program in its presentation editing mode. The user first assigns a particular transition effect to a pair of images, to which the presentation program responds by previewing the assigned transition effect (FIGS. 2A-2E). The user then previews a different presentation effect by selecting a visual presentation effect indication displayed in conjunction with another pair of images (FIGS. 2F-2J).

FIG. 2A shows the output displayed by the previewing program in its presentation editing mode. A display area 200 contains three images, 201, 202, 203, that comprise a sample presentation. These images are arranged in a presentation sequence from left to right, so that image 201 is the first image, which is followed in the sequence by the second image, 202, which is followed in the sequence by the third image, 203. While three images are shown here to facilitate the discussion of the invention, many actual presentations are comprised of a much larger number of images. Displayed beneath two of the images, 201 and 202, are transition effect icons 211 and 212, respectively. As described in greater detail below, the user is able to use these transition effect icons to preview transition effects. More generally, the previewing program provides visual indications that transition effects are assigned to particular groups of images which may be used to preview transition effects. In each case, the display of the transition effect icon indicates that a particular transition effect has been assigned to the pair of images comprising the image that the transition effect icon is displayed beneath and the image that immediately precedes the image that the transition effect icon is displayed beneath. For instance, transition effect icon 212 indicates that a transition effect has been assigned to a pair of images comprising image 201 and image 202. In the case of the first

image 201, the display of the transition effect icon 211 indicates that the pair of images comprising image 201 and a zeroth, or null, image, which is preferably a solid black rectangle (not shown).

In FIG. 2A, the user is assigning a presentation effect to the pair of images comprising image 202 and 203. The user first selected image 203 by using the mouse to click on a position inside it. The fact that image 203 has been selected is indicated by a dark border surrounding image 203. The user then selects a particular transition effect from a drop-down list box control 250. The user selects a "Cover Left" transition effect 251. By selecting the "Cover Left" transition effect while image 203 is selected, the user assigns the "Cover Left" transition effect to the pair of images comprising image 203 and the image that precedes it, image 202.

After the assignment of the "Cover Left" transition effect to the pair of images comprising image 202 and image 203, the previewing program preferably automatically previews this transition effect. As shown in FIG. 2B, the target image, 203 (FIG. 2A), is temporarily replaced with the source image 202. The previewing program then applies the assigned transition effect to the temporarily displayed source image to progressively transform it back into the target image. FIGS. 2B, 2C, and 2D each show this effect in a further stage of progression. In the case of the "Cover Left" transition effect assigned to images 202 and 203, the previewing program replaces each column of pixels of the displayed target image with the corresponding column of pixels of the target image, from the right-most column to the Left-most column. As can be seen from FIG. 2E, the previewing program also displays transition effect icon 213 to indicate that a transition effect has been assigned to images 202 and 203.

FIGS. 2F-2J show the user previewing a transition effect by selecting a transition effect icon. In FIG. 2F, the user selects transition effect icon 212 by using the mouse to click at a position within the transition effect icon, in order to preview the transition effect assigned to images 201 and 202. As shown by FIG. 2G, the previewing program first temporarily replaces the target image 202 with the source image 201. The facility then applies the transition effect assigned to images 201 and 202 to progressively transform the source image temporarily displayed in place of the target image with the target image. FIGS. 2H, 2I, and 2J each show this effect in a further stage of progression. The "Cover Right-Down" transition effect assigned to images 201 and 202 displays progressively larger rectangular sections of the target image that contain its lower right-hand corner in the upper left-hand corner of the source image, until the entire target image is displayed there and "covers" the source image.

FIGS. 3-5 are flow diagrams showing the steps performed by the previewing program. FIG. 3 is an overview flow diagram showing the steps performed by the preview program. As is generally true of event-driven programs, the previewing program is preferably organized as a user input processing loop. While the user input processing loop of the previewing program is preferably much more extensive than is shown in FIG. 3 in order to provide the full functionality of a state-of-the-art presentation program, only the portion of the previewing program's user input processing loop that is directly relevant to the present invention is shown. In step 310, the previewing program receives an instance of user input, such as a mouse click or a key press. In step 320, if the user input received in step 310 constitutes an instruction to assign a selected transition effect to a selected pair of images, such as interaction with the drop-down list box 250

shown in FIG. 2A, then the previewing program continues at steps 321-323 to assign and preview the selected transition effect, else the previewing program continues at step 330. In step 321, the previewing program assigns the selected transition effect to the selected pair of images. In step 322, the previewing program previews the assigned transition effect as shown in FIGS. 2B-2D and 2G-2J. Step 322 (along with identical step 331, discussed below) is discussed in greater detail below in conjunction with FIG. 4. In step 323, the previewing program displays a visual transition effect indication, or transition effect icon, in conjunction with the selected pair of images. More particularly, the previewing program preferably displays the transition effect icon beneath the target image of the selected pair of images. After step 323, the previewing program continues at step 310 to receive the next instance of user input.

In step 330, if the user input received in step 310 was a mouse click at a position within the transition effect indication for a selected pair of images, then the previewing program continues at step 331, else the previewing program continues to process other types of user input (not shown). In step 331, the previewing program previews the transition effect assigned to the selected pair of images as shown in FIGS. 2B-2E and 2G-2J. After step 331, the previewing program continues at step 310 to receive the next instance of user input.

FIG. 4 is a flow diagram showing the steps performed by the preview program in order to preview a transition effect. In step 401, the previewing program displays the source image in place of the target image, as shown in FIG. 2B. In step 402, the previewing program applies the transition effect assigned to the selected pair of images to the source image displayed in step 401. Step 402 is discussed with respect to a sample transition effect below in conjunction with FIG. 5. These steps then conclude.

FIG. 5 is a flow diagram showing the steps performed by the preview program in order to apply a sample transition effect. The steps shown are those performed by the previewing program in order to apply the "Cover Left" transition effect shown previously in FIGS. 2B-2E. In steps 501-503, the previewing program loops through each column of pixels comprising the bitmap of the source image from the right-most column to the left-most column. Step 501 marks the beginning of this loop, and step 503 the end. These "loop limit" symbols are discussed on page 6 of ANSI/ISO, 5807-1985, a standard for, among other things, symbols and conventions for program flowcharts promulgated by the International Standards Organization and adopted by the American National Standards Institute. In step 502, within the loop, the previewing program replaces the current column of pixels of the displayed source bitmap image with the corresponding column of pixels of the target bitmap image. In step 603, the previewing program repeats step 502 for the next column of pixels of the source image, if any remain. These steps then conclude.

While this invention has been shown and described with reference to preferred embodiments, it will be understood by those skilled in the art that various changes or modifications in form and detail may be made without departing from the scope of the invention. For example, virtually any type of transition effect for visually transforming a source image into a target image could be employed by the previewing program.

I claim:

1. A method in a computer program for designing a presentation comprising an ordered series of images, the method for previewing in a display area of a display device

a transition effect to a target image from a source image which immediately precedes the target image in the ordered series of images, comprising the steps of:

simultaneously displaying in the display area a plurality of the images of the presentation; selecting one of the displayed images as the target image; in response to input from a user, assigning one of a plurality of transition effects to the target image; and in response to assigning the transition effect to the selected image, and irrespective of further user input: displaying the source image in place of the target image, and applying the assigned transition effect to the source image displayed in place of the target image to transform the source image displayed in place of the target image into the target image.

2. The method of claim 1 wherein the step of displaying a plurality of the images includes the step of displaying a plurality of the images of the presentation that are contiguous in the ordered series of images.

3. A method in a computer program for designing a presentation comprising an ordered series of images, each of the images either having a transition effect type specifying how the image immediately preceding the image in the ordered series of images is to be transformed into the image in a presentation mode or having no transition effect type, the method for previewing in a display area of a display device a transition effect to a target image from a source image which immediately precedes the target image in the ordered series of images based upon input from a pointing input device, comprising the steps of:

simultaneously displaying in the display area a plurality of the images of the presentation; displaying in conjunction with each displayed image having a transition effect type a visual indication that the image has a transition effect type; and in response to the selection of one of the displayed indications by a user using the pointing input device, and irrespective of further user input: selecting as the target image the image whose displayed indication was selected by the user, displaying in place of the target image the source image immediately preceding the target image in the ordered series of images, and applying the transition effect type of the target image to the source image displayed in place of the target image to transform the source image displayed in place of the target image into the target image.

4. The method of claim 3 wherein the step of displaying a plurality of the images includes the step of displaying a plurality of the images of the presentation that are contiguous in the ordered series of images.

5. A method in a computer program for designing a presentation comprising a plurality of images, the method for previewing in a display area of a display device a selected transition effect that visually transforms a source image among the plurality of images to a target image among the plurality of images, comprising the steps of:

- (a) simultaneously displaying in the display area both the source image and the target image;
- (b) receiving a transition effect preview request from a user; and
- (c) in response to receiving a transition effect preview request:
  - (1) displaying the source image in place of the target image in the display area, and

(2) applying the selected transition effect to the source image displayed in step (c)(1) to visually transform the source displayed in step (c)(1) into the target image.

6. A method in a computer program for designing a presentation comprising a plurality of images, the method for previewing in a display area of a display device a selected transition effect that visually transforms a source image among the plurality of images to a target image among the plurality of images, comprising the steps of:

simultaneously displaying in the display area the source image in a first position and the target image in a second position;

receiving a transition effect preview request from a user; and

in response to receiving a transition effect preview request:

applying the selected transition effect to the source image to visually transform the source image displayed in the first position into the target image, and after applying the selected transition effect, redisplaying the source image in the first position.

7. A method in a computer program for designing a presentation comprising an ordered series of images, the method for previewing in a display area of a display device a transition effect between a consecutive pair of the images, comprising the steps of:

simultaneously displaying in the display area a plurality of the images of the presentation;

selecting a consecutive pair of the displayed images, the selected pair of images comprising a first selected image and a second selected image;

in response to input from a user, assigning one of a plurality of transition effects to the selected pair of images; and

in response to assigning the transition effect to the selected pair of images, and irrespective of further user input:

displaying the first selected image in place of the second selected image, and

applying the assigned transition effect to the first selected image displayed in place of the second selected image to transform the first selected image displayed in place of the second selected image into the second selected image.

8. A method in a computer program for designing a presentation comprising an ordered series of images, each consecutive pair of the images comprising a first image and a second image either having a transition effect type specifying how the first image of the pair is to be visually transformed into the second image of the pair in a presentation mode or having no transition effect type, the method for previewing in a display area of a display device a transition effect to the second image of a selected pair from the first image of the selected pair based upon input from a pointing input device, comprising the steps of:

simultaneously displaying in the display area a plurality of the images of the presentation comprising one or more consecutive pairs of images;

displaying in conjunction with each displayed consecutive pair of images having a transition effect type a visual indication that the pair has a transition effect type; and

in response to the selection of one of the displayed indications by a user using the pointing input device, and irrespective of further user input:

selecting the pair of images whose displayed indication was selected by the user, displaying the first image of the selected pair of images in place of the second image of the selected pair of images, and

applying the transition effect of the selected pair of images to the first image of the selected pair of images displayed in place of the second image of the selected pair of images to transform the first image of the selected pair of images displayed in place of the second image of the selected pair of images into the second image of the selected pair of images.

9. A method in a computer program for designing a presentation comprising an ordered series of images, the method for previewing in a display area of a display device a transition effect to a selected image from an image which immediately precedes the selected image in the ordered series of images, comprising the steps of:

simultaneously displaying in the display area a plurality of the images of the presentation;

in response to input from a user, assigning a selected one of a plurality of transition effects to a selected one of the displayed images; and

in response to assigning the selected transition effect to the selected image, and irrespective of further user input:

displaying in place of the selected image a preceding image that immediately precedes the target image in the ordered series of images, and

applying the assigned transition effect to the preceding image displayed in place of the selected image to transform the preceding image displayed in place of the target image into the selected image.

10. The method of claim 9 wherein the applying step includes the steps of replacing portions of the displayed preceding image with corresponding portions of the selected image according to a preselected pattern associated with the assigned transition effect until the preceding image has been completely replaced with the selected image.

11. An apparatus for previewing a selected transition effect which visually transforms a source image among a plurality of images comprising a presentation to a target image among the plurality of images, comprising:

a display device having a display area, within which is initially displayed the source image in a first position and the target image in a second position;

a request receiver for receiving a transition effect preview request from a user; and

a transition effect preview sequencer that operates in response to the receipt of a transition effect preview request by the request receiver, comprising:

a transition effect previewer for applying the selected transition effect to the source image to visually transform the source image displayed in the display area of the display device in the first position into the target image, and

a source image restorer for, after the operation of the transition effect previewer, causing the source image to again be displayed in the display area of the display device in the first position.

12. The apparatus of claim 11, further including:

a transition effect selector that selects a particular transition effect for visually transforming the source image into the target image in response to user input; and

a transition effect preview instruction generator that generates a transition effect preview instruction in response to the operation of the transition effect selector.

13. The apparatus of claim 11, further including:  
 an indication display module for displaying in conjunction with the source image and target image in the display area a visual indication that a particular transition effect has been selected for visually transforming the source image into the target image; 5  
 an indication selection monitor that receives user input selecting the visual indication displayed by the indication display module; and  
 a transition effect preview instruction generator that generates a transition effect preview instruction in response to the operation of the indication selection monitor. 10

14. An apparatus for previewing a selected transition effect which visually transforms a source image among a plurality of images comprising a presentation to a target image among the plurality of images, comprising:  
 a display device having a display area, within which is initially displayed the source image in a first position and the target image in a second position; 15  
 a request receiver for receiving a transition effect preview request from a user; and  
 a transition effect preview sequencer that operates in response to the receipt of a transition effect preview request by the request receiver, comprising:  
 a source image copier for displaying the source image in the second position of the preview area to replace the target image, and 20  
 a transition effect previewer for, after the operation of the source image copier, applying the selected transition effect to the source image displayed in the second position of the preview area to visually transform the source image displayed in the second position of the preview area into the target image. 25

15. The apparatus of claim 14, further including:  
 a transition effect selector that selects a particular transition effect for visually transforming the source image into the target image in response to user input; and  
 a transition effect preview instruction generator that generates a transition effect preview instruction in response to the operation of the transition effect selector. 30

16. The apparatus of claim 14, further including:  
 an indication display module for displaying in conjunction with the source image and target image in the display area a visual indication that a particular transition effect has been selected for visually transforming the source image into the target image; 45  
 an indication selection monitor that receives user input selecting the visual indication displayed by the indication display module; and  
 a transition effect preview instruction generator that generates a transition effect preview instruction in response to the operation of the indication selection monitor. 50

17. A method in a computer system for designing an ordered series of images, each pair of images that are adjacent in the ordered series either having a transition effect type specifying how a first member of the pair is to be visually transformed into a second member of the pair or having no transition effect type, the method comprising the steps of, while simultaneously displaying a plurality of adjacent pairs of images of the series:  
 (a) displaying in conjunction with each displayed pair of adjacent images having a transition effect type a visual indication that the pair of images has a transition effect type; 55  
 (b) receiving user input specifying the selection of the visual indication that a first one of the displayed pairs of images has a transition effect type; 60

10

(c) in response to step (b):  
 (1) displaying the image that is the first member of the first pair in place of the image that is the second member of the first pair, and  
 (2) applying the transition effect type of the first pair to the image that is the first member of the first pair displayed in place of the image that is the second member of the first pair in order to visually transform the image that is the first member of the first pair displayed in place of the image that is the second member of the first pair into the image that is the second member of the first pair; and  
 (d) receiving user input specifying the selection of the visual indication that a second one of the displayed pairs of images has a transition effect type;  
 (e) in response to step (d):  
 (1) displaying the image that is the first member of the second pair in place of the image that is the second member of the second pair, and  
 (2) applying the transition effect type of the second pair to the image that is the first member of the second pair displayed in place of the image that is the second member of the second pair in order to visually transform the image that is the first member of the second pair displayed in place of the image that is the second member of the second pair into the image that is the second member of the second pair.  
 18. A computer-readable medium whose contents cause a computer system to design an ordered series of images by performing the steps of, while simultaneously displaying a plurality of pairs of images that are adjacent in the ordered series:  
 (a) receiving user input specifying the assignment of a transition effect to a first one of the displayed pairs of adjacent images;  
 (b) in response to step (a), irrespective of further user input:  
 (1) displaying the image that is the first member of the first pair in place of the image that is the second member of the first pair, and  
 (2) applying the transition effect type of the first pair to the image that is the first member of the first pair displayed in place of the image that is the second member of the first pair in order to visually transform the image that is the first member of the first pair displayed in place of the image that is the second member of the first pair into the image that is the second member of the first pair; and  
 (c) receiving user input specifying the assignment of a transition effect to a second one of the displayed pairs of adjacent images;  
 (d) in response to step (c), irrespective of further user input:  
 (1) displaying the image that is the first member of the second pair in place of the image that is the second member of the second pair, and  
 (2) applying the transition effect type of the second pair to the image that is the first member of the second pair displayed in place of the image that is the second member of the second pair in order to visually transform the image that is the first member of the second pair displayed in place of the image that is the second member of the second pair into the image that is the second member of the second pair.  
 19. A computer-readable medium whose contents cause a computer system to preview in a display area of a display

**11**

device of the computer system a selected transition effect that visually transforms a source image among a plurality of images comprising a visual presentation into a target image among the plurality of images comprising the visual presentation by performing the steps of:

5

- (a) simultaneously displaying in the display area both the source image and the target image;
- (b) receiving a transition effect preview request from a user; and

**12**

- (c) in response to receiving a transition effect preview request:
  - (1) displaying the source image in place of the target image in the display area, and
  - (2) applying the selected transition effect to the source image displayed in step (c)(1) to visually transform the source displayed in step (c)(1) into the target image.

\* \* \* \* \*